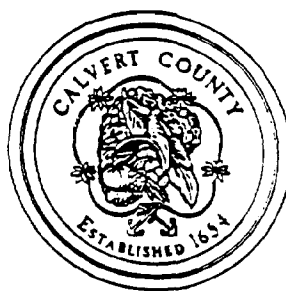


GRANT NO. NA170Z0497-01

TASK 22

**HUNTING CREEK
WATERSHED MANAGEMENT PLAN**

DRAFT



CALVERT COUNTY, MARYLAND

Prepared by:

**Paul H. DiNunno
David C. Brownlee, PhD.**

April 15, 1993

**Department of Planning & Zoning
176 Main Street
Prince Frederick, MD 20678
(410) 535-2348 (301) 855-1243
TDD (410) 535-6355**

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**Maryland Department of Natural Resources
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Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401**

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**CALVERT COUNTY
DEPARTMENT OF PLANNING & ZONING**

176 Main Street
Prince Frederick, Maryland 20678
Phone (410) 535-2348 (301) 855-1243
TDD (410) 535-6355

Director
Frank A. Jaklitsch

Board of Commissioners
Patrick M. Buehler
Mary M. Krug
Hagner R. Mister
Michael J. Moore
Joyce Lyons Terhes

April 15, 1993

This note is provided to the personnel of the various departments and agencies reviewing this document. This version of the Hunting Creek Watershed Management Plan is a draft plan. It is a partially complete document and should be viewed as such. Sections within this document are currently being updated. Uncompleted sections shall be denoted by enclosing the title of the section in brackets. Please submit your comments to our department so that changes may be made to the document prior to finalization. Please note that even this draft remains a *draft* plan. You will receive updates of the plan and your involvement and participation will be requested in finalizing this draft into an adopted plan.

Should you have and questions and/or comments regarding this document, please submit them to either of us in writing or by verbal communication. Thank you for your time and effort in this endeavor.

Sincerely,

David C. Brownlee, PhD.
Environmental Planner
Calvert County Planning and Zoning

Paul H. DiNunno
Watershed Management Intern
Calvert County Planning and Zoning

PHD/phd

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INTRODUCTION

Hunting Creek is the largest watershed in the County encompassing approximately 29 square miles of land. Within the watershed lies Prince Frederick Town Center and the location of the County Seat. Prince Frederick is one of the three Major Town Centers recognized in the County's Comprehensive Plan. These Major Town Centers are expected to be centers of residential and commercial growth. As such, they potentially pose a threat to environmental quality. The Watershed Management Plan for the Hunting Creek watershed which includes about one-half of the Prince Frederick Town Center will identify, manage and protect the most sensitive natural resources in this watershed and would guide development in an environmentally sensitive manner.

The Calvert County Comprehensive Plan (CCCP) has been the guiding force behind the planning efforts of the County. The authority for this document is provided by the Annotated Code of Maryland, Article 66B and its adoption by the Board of County Commissioners of Calvert County in 1983. The Comprehensive Plan outlines certain guidelines regarding the environment and growth management that pertain to the efforts in the Hunting Creek watershed.

ENVIRONMENT

The Comprehensive Plan clearly outlines its objectives regarding the protection of our County's natural resources:

- 1) Protect those natural environmental features which will ensure continuance of a healthy and pleasant place to live for current residents and future generations.
- 2) Foster greater public awareness, education, and support of sensitive environmental concerns.
- 3) Encourage environmental protection and wise use of natural resources.
- 4) Encourage regeneration of lost and/or damaged natural environmental features . . . (CCCP, 1983).

The increase in population and the expansion of developed land endangers the environment and threatens the health and safety of Calvert County citizens. Several "primary" environmental concerns have been identified. Many of these concerns are to be addressed in the Hunting Creek Watershed Management Plan.

The protection and conservation of our ground water resources is critical to maintaining an affordable, pristine water supply. Infiltration of contaminants and excessive consumption will compromise our potable water supply. Surface waters have experienced a degradation in overall quality resulting in the loss of many aquatic species. Losses in wetland habitat has resulted in depriving the County of valuable flood and pollution control, and habitat for aquatic organisms, water fowl, and many other wildlife species (CCCP, 1983). Innovative approaches, such as

environmental education, waste water disposal techniques, woodland preservation, Critical Natural Area zoning, etc., must be implemented to prevent further degradations and provide for the restoration of damaged resources.

GROWTH MANAGEMENT

Growth management is an important environmental protection tool. It concentrates growth in designated areas where pollution prevention systems exist or can be provided (e.g. community sewerage systems, stormwater management devices) and can relieve development pressures on farm, forest and environmentally sensitive land outside of the designated development areas.

Roads, public facilities including water and sewer systems may be planned for future growth as opposed to retroactively responding to growth. Infill development of partially developed regions leads toward more efficient use of existing facilities. The location and type of new housing can be directed to satisfy the needs of the County. Finally, the County may direct growth into designated development regions thus alleviating pressure on agricultural and sensitive areas (CCCP, 1983).

Measuring the growth of a county can be interpreted many different ways. For this reason, Calvert County has clearly defined their interpretation and reasons for managing growth:

- 1) Population growth is not a proper measure of the County's progress. Progress should be measured in terms of quality of life.
- 2) Given a certain population level in a given area and growth rate, public and private services and facilities should be planned accordingly.
- 3) Growth pressures will probably continue for the planning period of 10 to 20 years and perhaps longer.
- 4) Growth is due to factors over which the county government can exert some influences.
- 5) Growth can and should be directed and regulated by the County.
- 6) Increased population growth often results in higher per-capita costs of government and public services.
- 7) Unmanaged growth may adversely affect the quality of life by causing problems relating to health, safety and general welfare (CCCP, 1983).

The County may manage growth through Zoning practices, the Agricultural Preservation Plan, and through Official Mapping. Zoning regulates the placement, category, and density of land use. Current zoning techniques are directed at

concentrating growth in Town Centers, most notably Prince Frederick. Amendments to the Zoning Ordinance or regional ordinances (i.e. Prince Frederick Zoning Ordinance, Huntingtown Zoning Ordinance, etc.) may be made as deemed necessary by County citizens and local government through the public hearing process. The Agricultural Preservation Plan allows for the transfer of development rights from agricultural land to specified receiving zones. This transfer places an easement on the agricultural land forbidding further development while the receiving zone may increase its density. The use of Official Mapping is used to a limited degree in Calvert County. Its main purpose is to promote orderly development in relation to the County's future plans (CCCP, 1983).

Based on the recommendations of the Comprehensive Plan, the County needs to develop procedures and regulations for planned and balanced growth and provide for the protection of the County's natural resources. The Hunting Creek Watershed Management Plan addresses both of these needs.

HUNTING CREEK WATERSHED

SIZE AND LOCATION

Hunting Creek is the largest watershed in Calvert County, encompassing nearly 29 square miles of land. It is located in the central portion of the County and extends from its tidal mouth at the Patuxent River on the west to within a mile of the Chesapeake Bay on the east (Figure 1). The watershed topography is relatively flat and low near the mouth of the creek where there are abundant tidal wetlands and some nontidal wetlands. As the watershed rises in elevation to the east the topography develops into a dendritic system of ridges and valleys.

The main highway through Calvert County, Rt. 2/4, bisects the watershed about a 1/2 mile to the east of the head of tide. There is one major and one minor town center both of which are approximately half in the watershed. The major town center of Prince Frederick is located on the southeast portion of the watershed and the minor town center of Huntingtown is located on the north-central edge of the watershed.

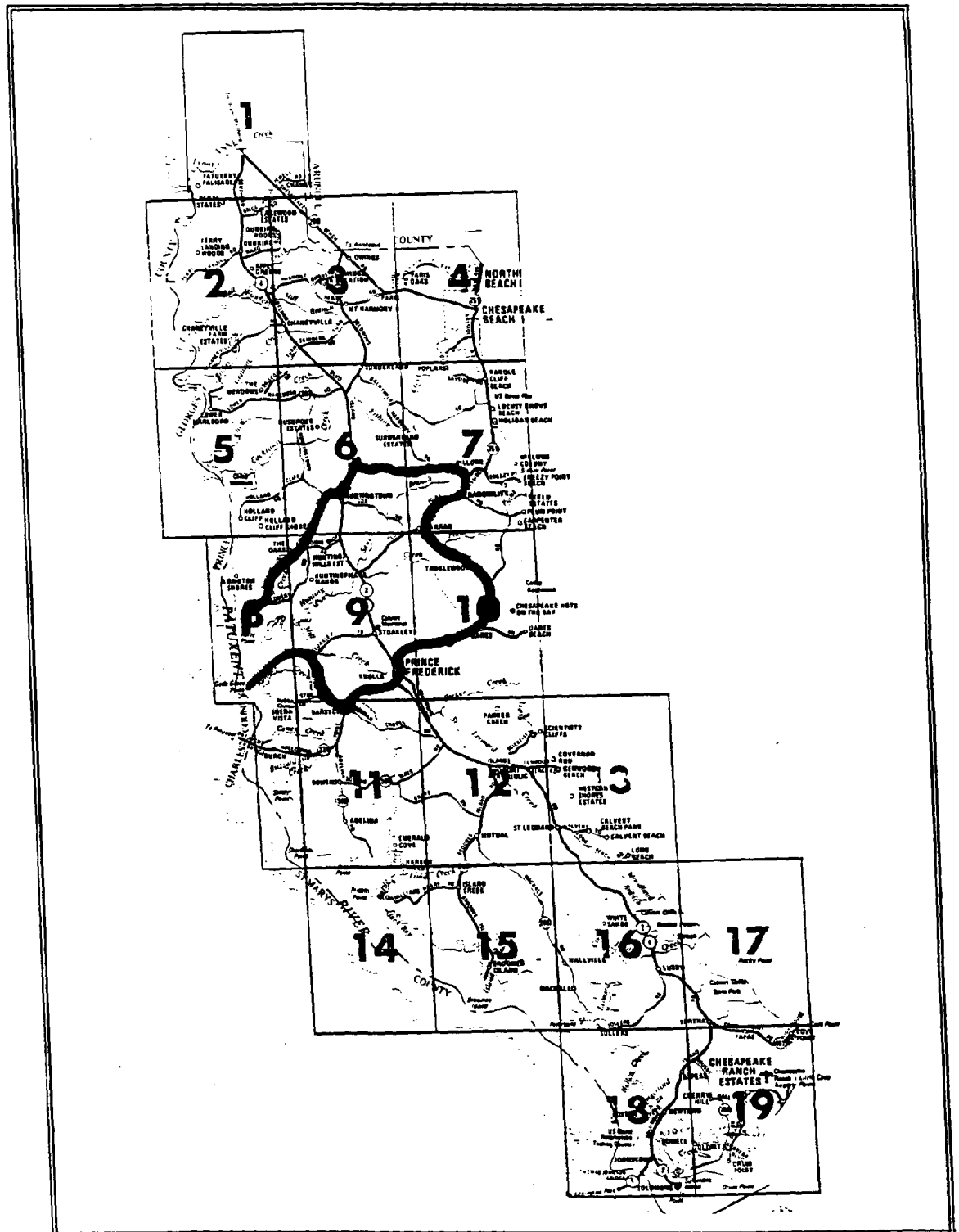


Figure 1 Hunting Creek watershed location and size (ADC, 1979).

EXTENT OF WETLANDS

Based on the Soil Conservation Service (SCS) Soil Survey of Calvert County and the Maryland Department of Natural Resources (DNR) National Wetland Inventory (NWI), potential wetlands within the Hunting Creek watershed comprise 6.6% (NWI) to 11.2% (SCS survey) of the land. The discrepancy between these figures is the larger extent of potentially hydric soils than existing identified wetlands. Further details on the wetlands within the watershed may be found in the Hunting Creek Watershed Management Plan.

[LAND USE]

From colonial times until the mid 1960's the predominant land use in Calvert County was agriculture and forestry. About 1966 significant changes began to occur in land use patterns, and in developments affecting land use. Major highway improvements were started, several major residential subdivisions were opened, immigration accelerated, bonds were sold for a major program of construction of new school facilities, plans were formulated for a County Industrial Park and other economic developments. During 1966-70 construction of the Calvert Cliffs Nuclear Power Plant was planned and started. In addition, construction of a plant for processing imported liquified natural gas (LNG) was begun. All of these factors contributed to a dramatic change in land use and pressured the County to take action regarding these changing conditions.

Current land use, as of 1990, for the Hunting Creek watershed is depicted in Figure 2. The majority of agricultural uses lie to the west of Route 2/4. Large tracts of continuous forested land lies to the east of this traffic corridor. Development seems to be concentrated within the Huntingtown and Prince Frederick Town Centers in addition to sporadic residential subdevelopments scattered within the watershed.

The watershed is comprised of 18,569 acres of land, of which 4,591 acres (25%) is cropland and pasture and 5,618 acres (30%) is forest. The portions of the town centers of Prince Frederick and Huntingtown which are in the watershed account for approximately ____ acres (__ %) and approximately ____ of this is currently developed (____ acres, __ %). Institutional use within the Watershed which is outside of the Town Centers covers approximately ____ acres (__ %) and includes: schools - Calvert High, Calvert Middle, Calvert Elementary, Calvert Country, Calverton; and County facilities - Calvert Pines Senior Center, Calvert County Jail and Treatment Center, County Maintenance Facility, recently completed and capped but unlined County Landfill, County compactor site for trash disposal and pick-up and slow-rate land application sewerage treatment plant.

The Twenty Year Land Use Plan emphasizes residential growth in towns and directs commercial and multi-family development to Town Centers. Basic considerations in the adoption of this policy were the protection of the natural environment, maintenance of the lifestyle of the area, and the provision of adequate public facilities. The County Comprehensive Plan identifies specific land use categories and addresses ways and means of directing growth in these areas. In general, the Comprehensive Plan proposes that growth should take place in and around existing developed areas and that the Patuxent watershed should be restricted to low density development.

The next logical step beyond the County Comprehensive Plan and the Town Center Master Plans is the development of Watershed Management Plans tailored to the individual needs of the communities within the County's watersheds. Work has been initiated on developing Watershed Management Plans for the Hunting and Parker Creek watersheds.



- LOW DENSITY RESIDENTIAL AND OPEN SPACE LAND
- MEDIUM/HIGH DENSITY RESIDENTIAL & INSTITUTIONAL LAND
- COMMERCIAL AND INDUSTRIAL LAND
- CROPLAND
- PASTURE LAND
- ANIMAL PRODUCTION FACILITIES
- OTHER AGRICULTURAL FACILITIES
- FOREST COVER
- WATER
- WETLANDS
- BARREN LAND
- MINERAL EXTRACTION AREAS

Draft Watershed Management Plan
 Figure 2. 1990 Land Use in Hunting Creek Watershed (MOP, 1991).
 Page 10

HUNTING CREEK WATERSHED MANAGEMENT PLAN

GOALS AND ISSUES

This management plan has been formulated based on the guidelines outlined in "A Guide for Developing Nontidal Wetlands Watershed Management Plans in Maryland," a draft document produced by Maryland Department of Natural Resources (DNR), Water Resources Administration (WRA). The following are goals and issues pertaining to the Hunting Creek Watershed Management Plan:

1) Protect natural resources

The location of residential and commercial development as well as the location of sewerage and solid waste disposal in the Hunting Creek watershed have been identified and data has been collected on these development issues. Forest and tree preservation, limits to impervious surfaces, regional and site specific stormwater management approaches and sediment erosion control techniques will be addressed in the Plan for the purpose of preventing the deterioration of coastal resources. The Plan shall identify the issues and concerns of Calvert citizens and government departments.

2) Facilitate economic development in town centers

The draft Watershed Management Plan will be reviewed by local, state, and federal agencies as well as public review through the means of the Hunting Creek Watershed Task Force and eventually public hearing. It will thus reflect the diverse interests of the community and the final product should serve as an agreement among the residents of the community to develop the area in an environmentally sensitive manner. By following the guidelines in this watershed plan, developers will be facilitated in obtaining permits from state and federal agencies which should assist economic development.

3) Address wetland loss and mitigation on a watershed scale

Field verifications of potential wetlands were conducted by a private consultant for the region of Hunting Creek that lies within the Prince Frederick Town Center (Appendix B). Calvert County is pursuing the concept of a communication link between the County and wetland permitting agencies regarding the location and extent of wetland filling and mitigation within the Hunting Creek Watershed. This information would enable the County to amend corrections to its mapping efforts and provide data necessary to observing the effectiveness of this Plan.

4) Assure public health and safety

Monitoring projects within the watershed will provide early warning signs should septic systems fail, and pollution reach unhealthy limits. A review of existing flood

hazard problems, and the potential of increased flood hazard due to development (stormwater management, water impoundments) will be addressed should our efforts petitioning the Army Corps of Engineers for a regional hydrological and hydraulic study prove successful. In addition, measures to assure and protect water supply for [fire protection and] human consumption will be included.

5) Public Participation

Any form of management effort will fail without the input and support of the public. For this reason the Hunting Creek Watershed Management Task Force was formed. In their initial meetings issues regarding the creek were formulated:

- 1) The effects of beavers, good or bad?
- 2) Sediment control
- 3) Stormwater management (hospital problem area)
- 4) Education of homeowners
 - Monitoring own backyard
 - Identify and use service groups and TV for access to public
 - Media campaign
 - Lawn care
- 5) Wetland losses with and without permits
- 6) The effectiveness of wetland mitigation
- 7) Farming effects on water quality
- 8) Water pollution; pesticides, fertilizers (nutrients)
- 9) Identification of establishment of baseline data (pesticides, toxics, acid rain, nutrients)
- 10) Nutrient management (livestock on farms, lawn care)
- 11) Eagle nest sites
- 12) Other rare or endangered species
- 13) Septic system failure
- 14) Forestry operations
- 15) Future development
- 16) Underground storage tanks
- 17) Commercial nurseries, tree farms
- 18) Building practices
- 19) Motorboat impacts

NATURAL RESOURCE IDENTIFICATION

As part of the Watershed Management Plan, Calvert County has undergone a campaign to locate and document its natural resources. In this process, the County has documented and digitally mapped the extent and location of potential wetlands within the watershed. The "My" hydric soils identified in the Soil Survey of Calvert County, published by the SCS, were placed on the County's flood insurance maps.

Water supply concerns are being researched and addressed. The extent of forested land within the County has been documented and provisions have been made for its conservation. And finally, rare, threatened and endangered species habitat has been identified and regulations have been established for their protection through the provisions of the Critical Area program.

WETLANDS

Using the SCS Soil Survey of Calvert County and the DNR National Wetland Inventory, a map was generated identifying potential wetlands within the Hunting Creek watershed (reproduction enclosed, color copies are on display for use at the Department of Planning and Zoning of Calvert County, Maryland). The individual areas of both soil groups and wetlands were tabulated (Appendix A) and interpreted. It was determined that of the land that comprises the watershed, 6.6% was identified as wetlands by the NWI and 11.2% was identified as potentially hydric by the SCS survey (inclusive of the identified wetlands). Figure 3 illustrates the percentage of land that is catagorized as potential wetlands.

Regarding the SCS survey, of the potentailly hydric soils identified, 68.3% were clasified as "My" soils, 15.0% were clasified as "Sx" or "Tm" soils, and the remaining 16.7% were "Ek, FsA, FsB, Gp, LmB, OtA, OtB" soil groups. The NWI has identified that of the wetlands within the watershed, 27.1% are estuarine, 60.3% are palustrine forested, 5.7% are palustrine open water, 4.4% are palustrine emergent, and 2.5% are palustrine scrub or brush wetlands. These distributions are presented in Figures 4 and 5.

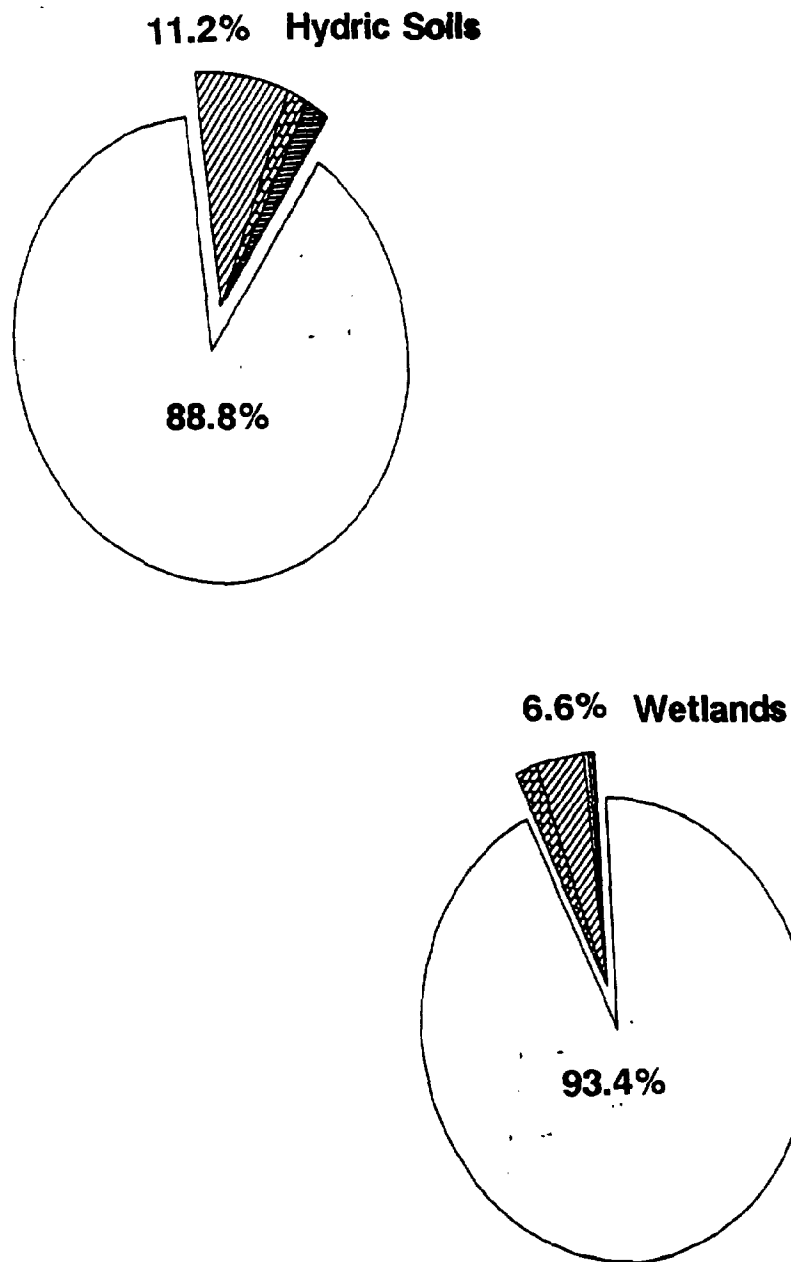


Figure 3 Percentage of land that is catagorized as potential wetlands.

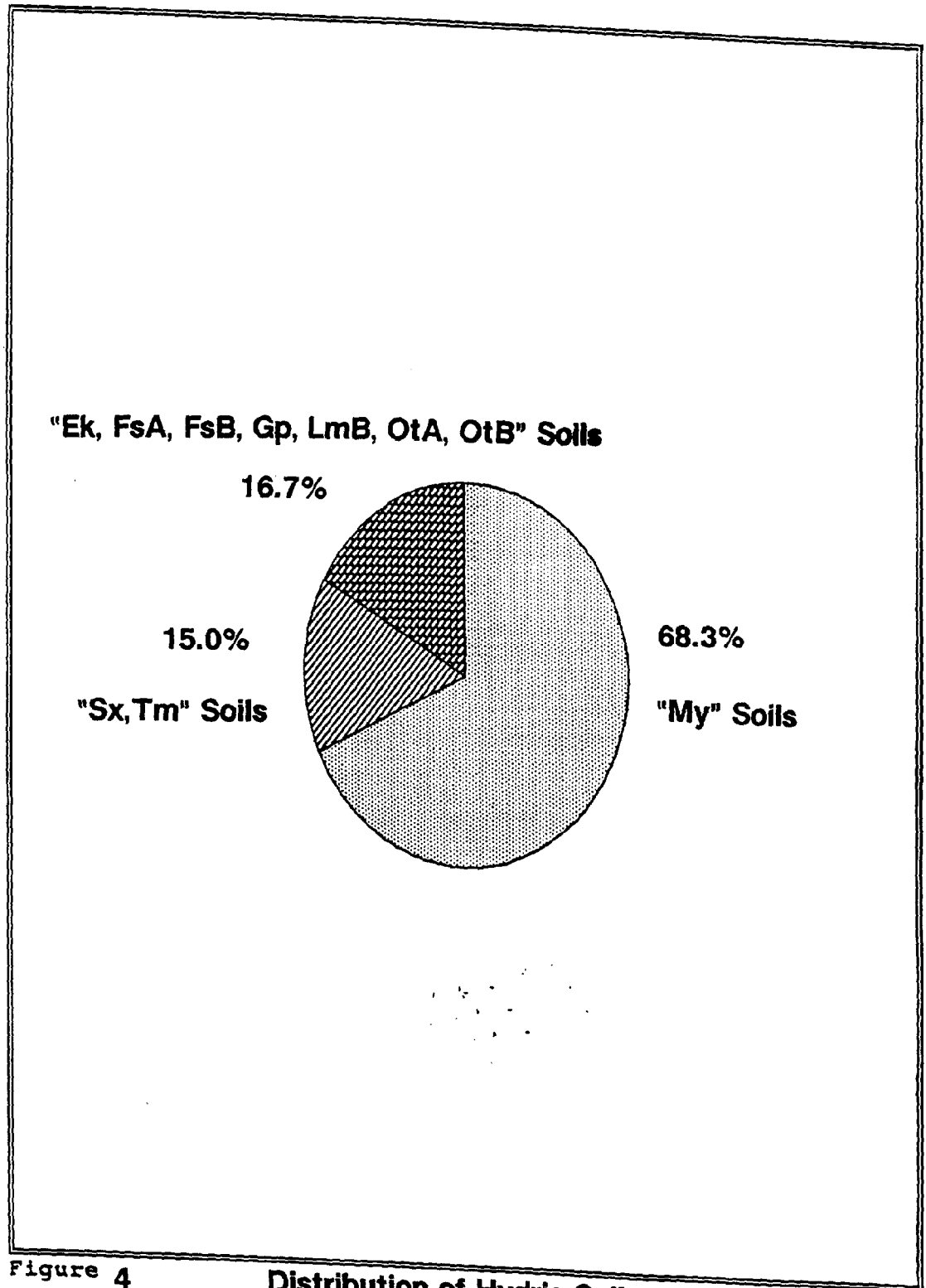


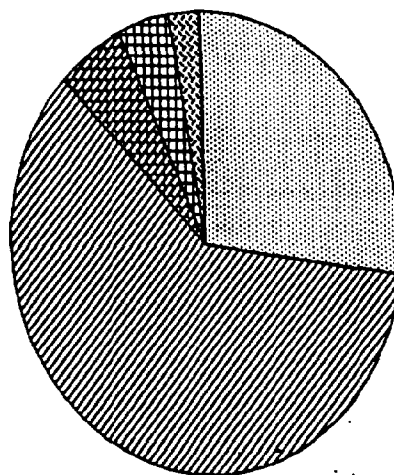
Figure 4 **Distribution of Hydric Soils.**

5.7% Palustrine Open Water

4.4% Palustrine Emergent

2.5% Palustrine Scrub/Brush

27.1% Estuarine



60.3% Palustrine Forested

Figure 5

Distribution of Wetland Types.

FLOODPLAINS

Flood plain areas which are also wetlands are natural stormwater management devices, are rich in species diversity and often are the habitat of rare, threatened or endangered species. These areas are usually heavily vegetated with forests, scrub shrub plant associations, or emergent plant species and the soils are often hydric. Due to the presence of the hydric soils and vegetation the flood plains are excellent nutrient removal systems and thus reduce pollutants entering our waterways. Thus, the wetland flood plains provide an extremely valuable service to Calvert County citizens.

Due to the value of wetland flood plains, development should be directed away from these areas. Development in non-wetland flood plains should also be discouraged as storm events (hurricanes and heavy rainstorms) may cause severe flooding in these areas. Loss of life and property during flooding is the result of improper placement and inadequate protection of structures in flood plain areas. Development in the 100 yr flood plain (area where a flood is likely to occur on the average of once every 100 years) is controlled by the Calvert County Flood Management Ordinance (updated in 1992). In Calvert County, the 100 yr. flood plain is defined as those area depicted on the Calvert County Flood Insurance Rate Maps (FIRM), areas indicated by "My" soils in the Calvert County Soil Survey and areas adjacent to flood plains where the elevation is less than that of the 100 Yr. flood.

WATER SUPPLY

Calvert County is situated over a favorable geological formation of groundwater resources. Four major aquifers (the Piney Point, Nanjemoy, Aquia, and Magothy) supply nearly all of the County's potable water. In the region around Prince Frederick Town Center, these aquifers reside 150-250 (Nanjemoy), 400-500 (Aquia), and 650-700 (Magothy) feet below sea level. The Piney Point aquifer develops further South in the County and around the Calvert Cliffs Facility, it resides at about 150-300 feet below sea level. At this location, the Nanjemoy and Piney Point formations are hydrologically connected and difficult to distinguish (DNR, 1987). The Piney Point aquifer does not seem to be used in the Hunting Creek Watershed and will not be addressed in this Plan. The depths of these formations in relation to specific well test sites, are demonstrated in Figure 6 for further clarification. The outcrop regions for these aquifers reside to the North and West of Calvert County as shown in Figure 7 for the Nanjemoy and Aquia formations, and Figure 8 for the Magothy formation. General groundwater flows of these aquifers are simplified in Figure 9.

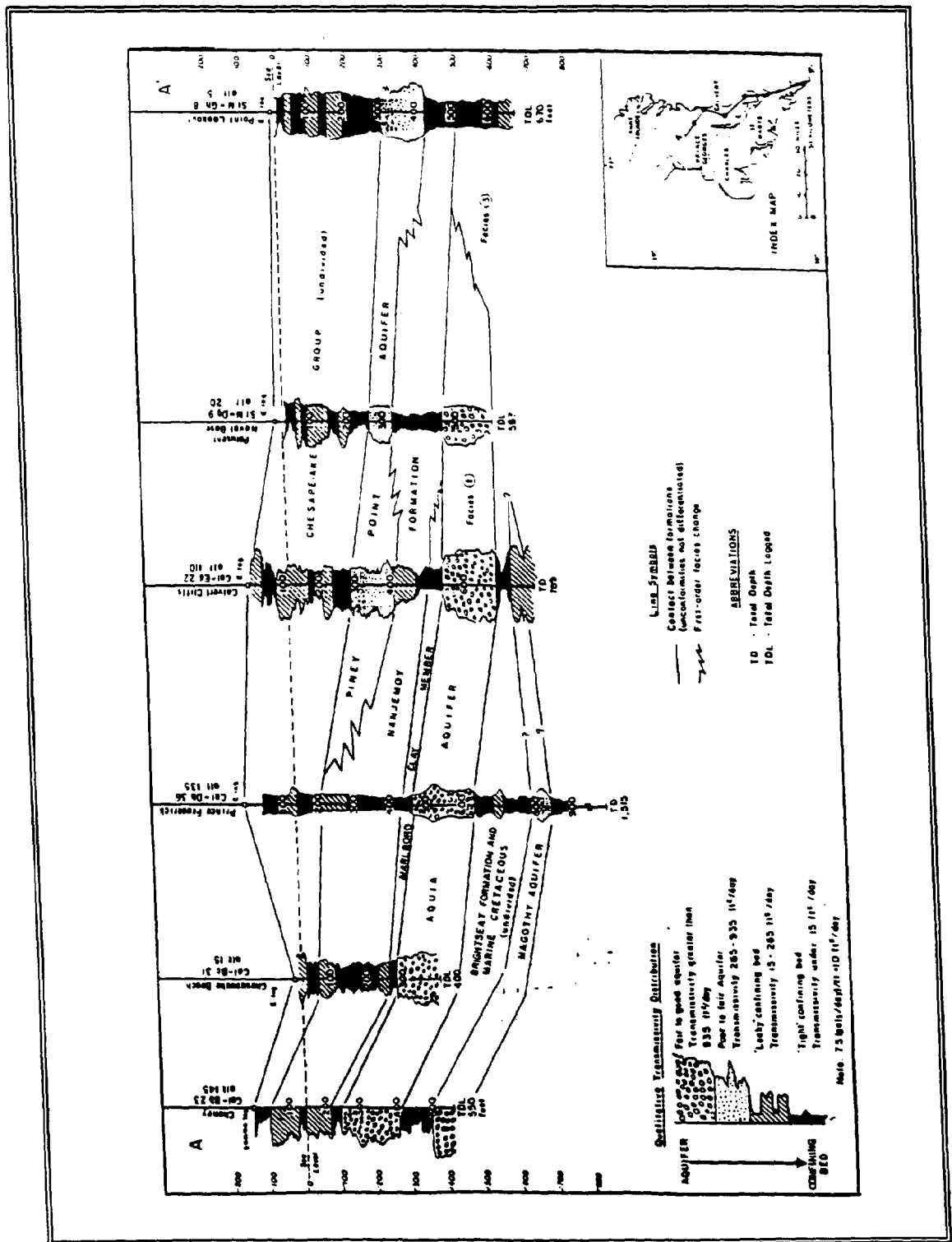
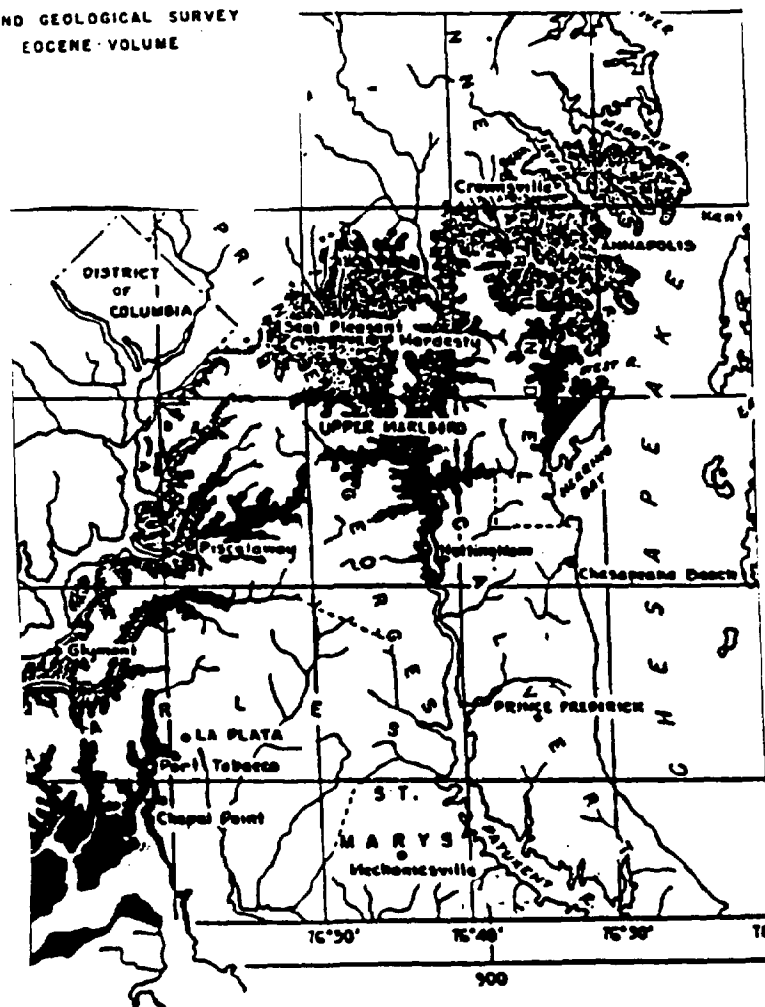


Figure 6 Depths of groundwater formations.

OUTCROP DISTRIBUTION
OF
THE EOCENE FORMATIONS
OF
MARYLAND
FROM
MARYLAND GEOLOGICAL SURVEY
EOCENE VOLUME



EXPLANATION

- Nonjamez Formation
- Aquia Formation

SCALE

0 5 10 15 Miles

Figure 7 Outcrop Regions (Overbeck, 1951).
Draft Watershed Management Plan
Page 20

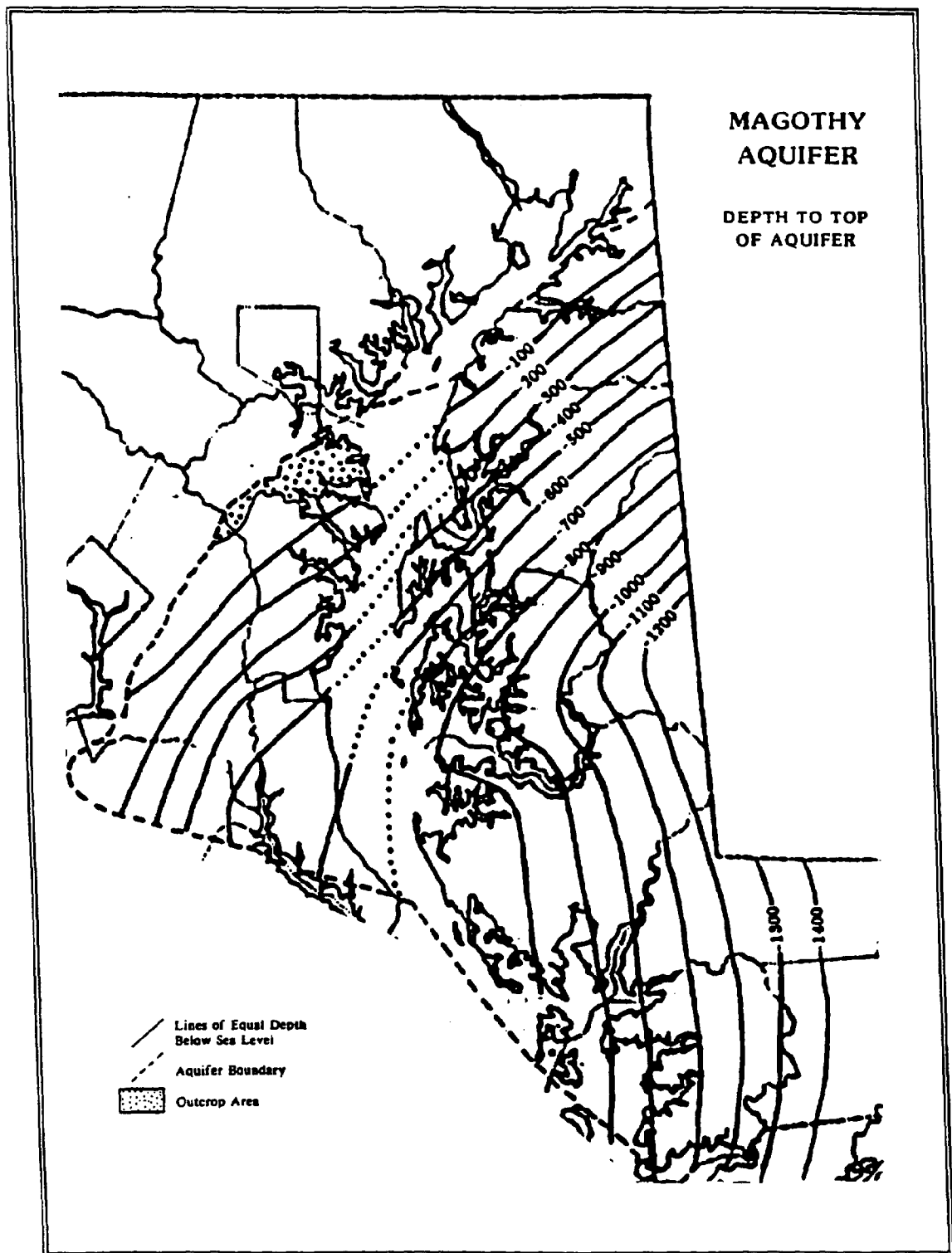


Figure 8 Outcrop Regions.

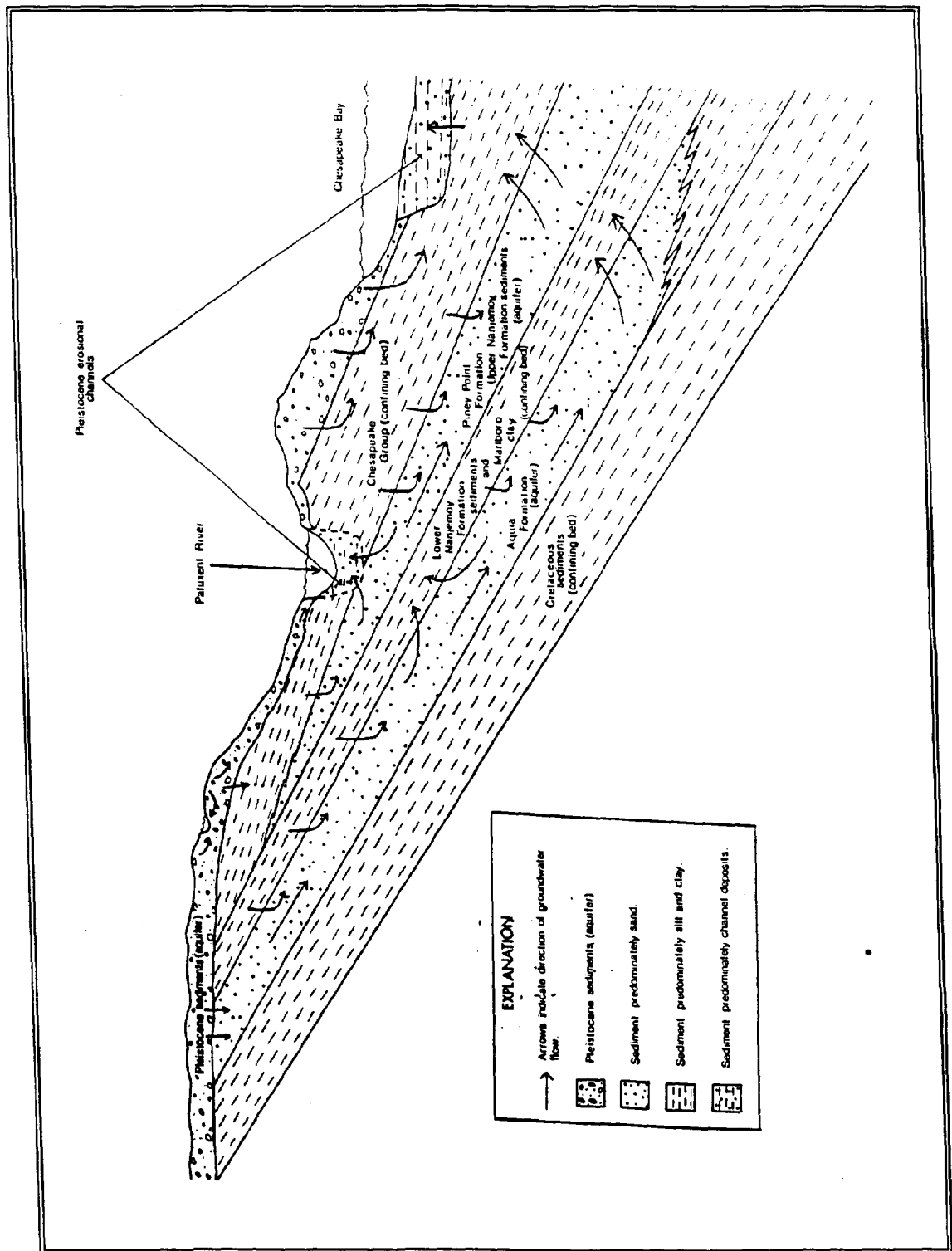


Figure 9 Simplified groundwater flow.

HABITAT OF SPECIAL CONCERN

The Calvert County Comprehensive Plan encourages the preservation and conservation of wildlife habitats. The Critical Area Program has specific requirements for activities in habitat protection areas and the Forest Conservation Program identifies areas of important habitat value for rare, threatened and endangered species as a priority area for retention.

The Maryland Department of Natural Resources has not identified any Federal or State threatened or endangered species (plant or wildlife) within the watershed to date. In 1984, a regional survey determining the extent and location of anadromous fish spawning in the Patuxent River and its tributaries was completed. Graphic representation of the findings are located in Figures 10 through 13. The report identified that of the 19 streams sampled on the lower Patuxent, only two were sites exhibiting river herring spawning: Cocktown Creek and Hunting Creek. Gravid white perch were collected nearly six miles upstream in Hunting Creek, the furthest upstream spawning recorded of the 19 streams. Yellow perch eggs and larvae were recorded at the Route 2/4 crossing, only one of two tributaries of the 19 to express this trait (O'Dell and Mower, 1984). The data concerning Hunting Creek has been compiled in Table I. This Plan will act as an Anadromous Fish Spawning Protection Plan in addition to its other functions.

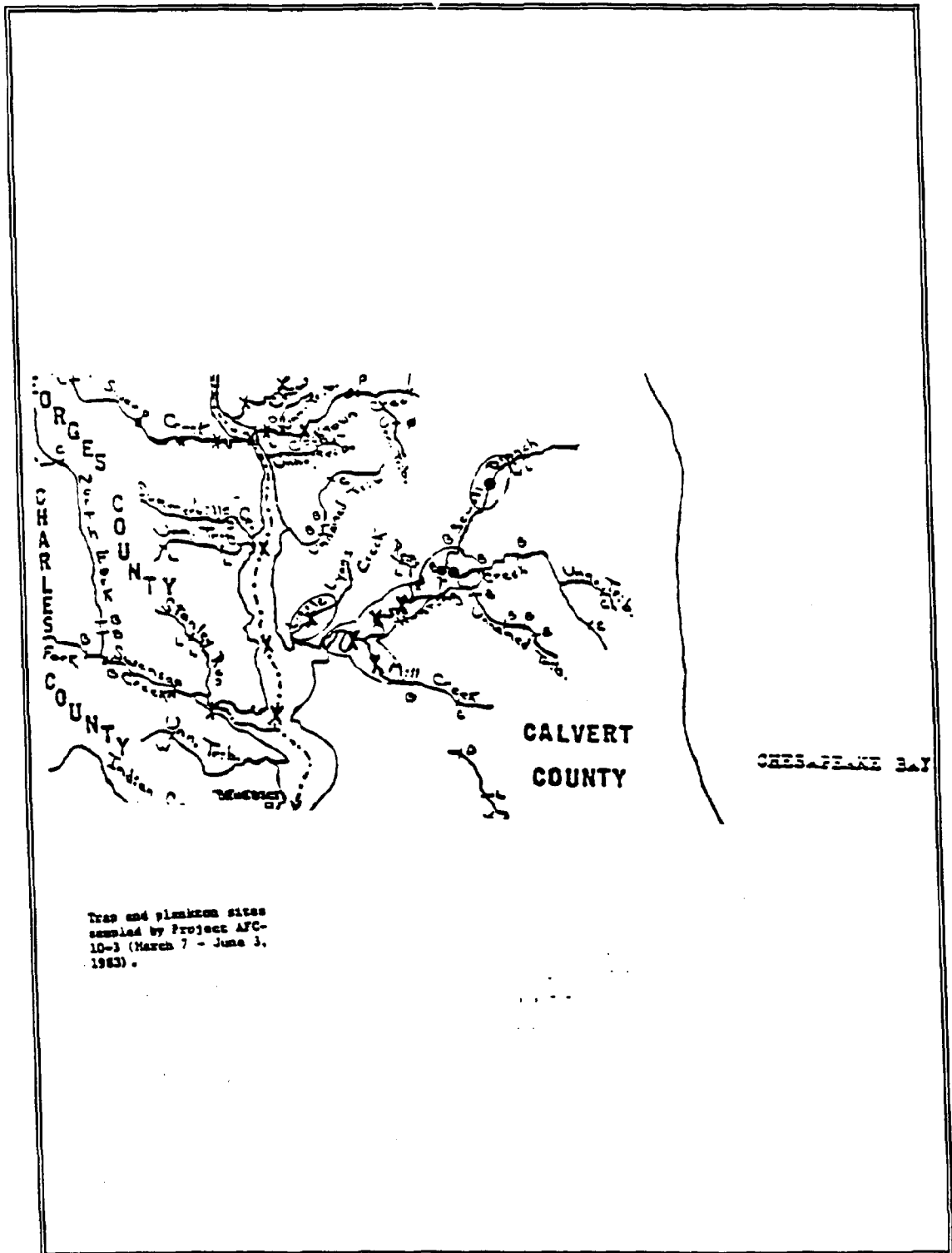


Figure 10 Anadromous Fish sampling sites (O'Dell & Mower, 1964).

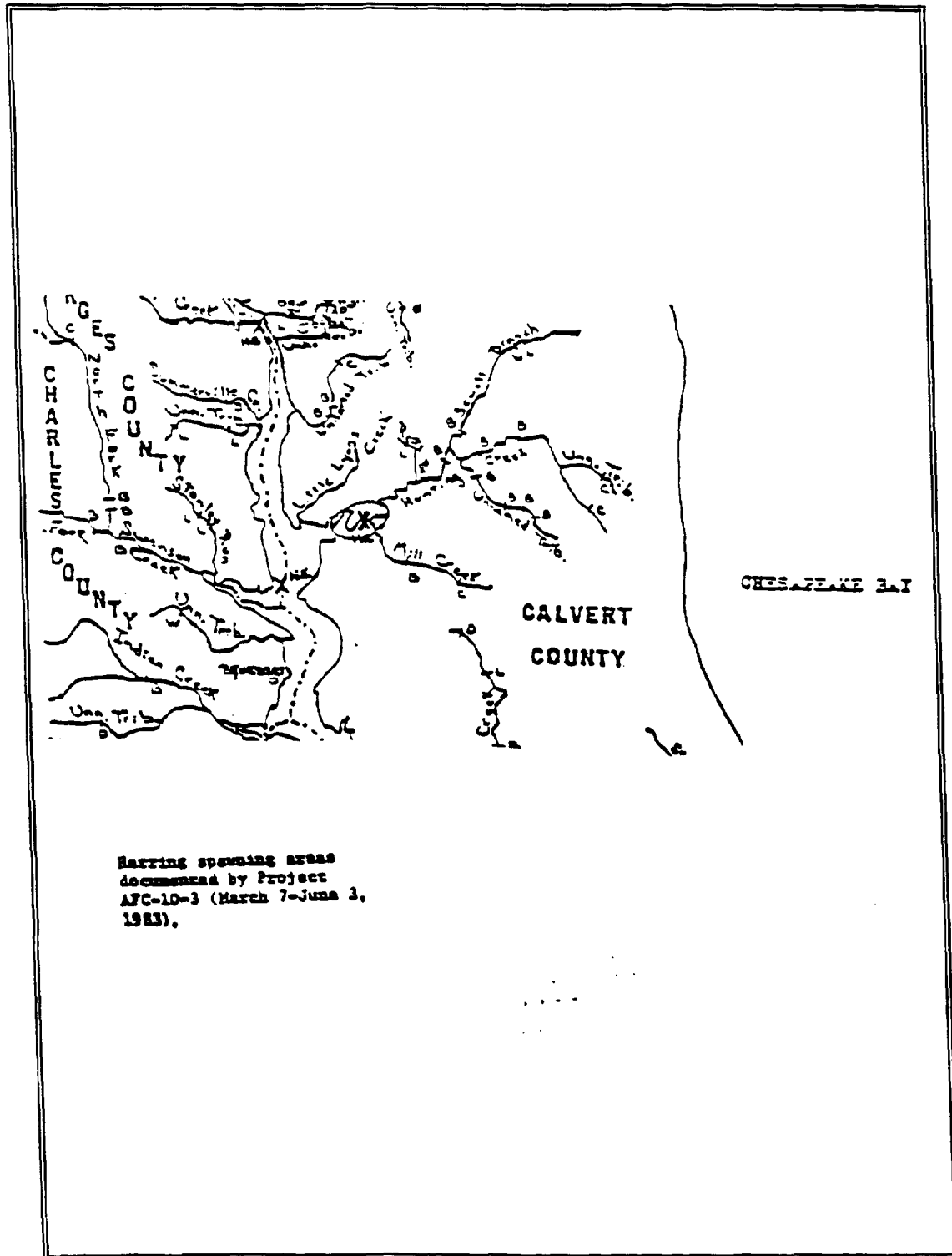


Figure 11 Herring Spawning areas (O'Dell & Mower, 1984).

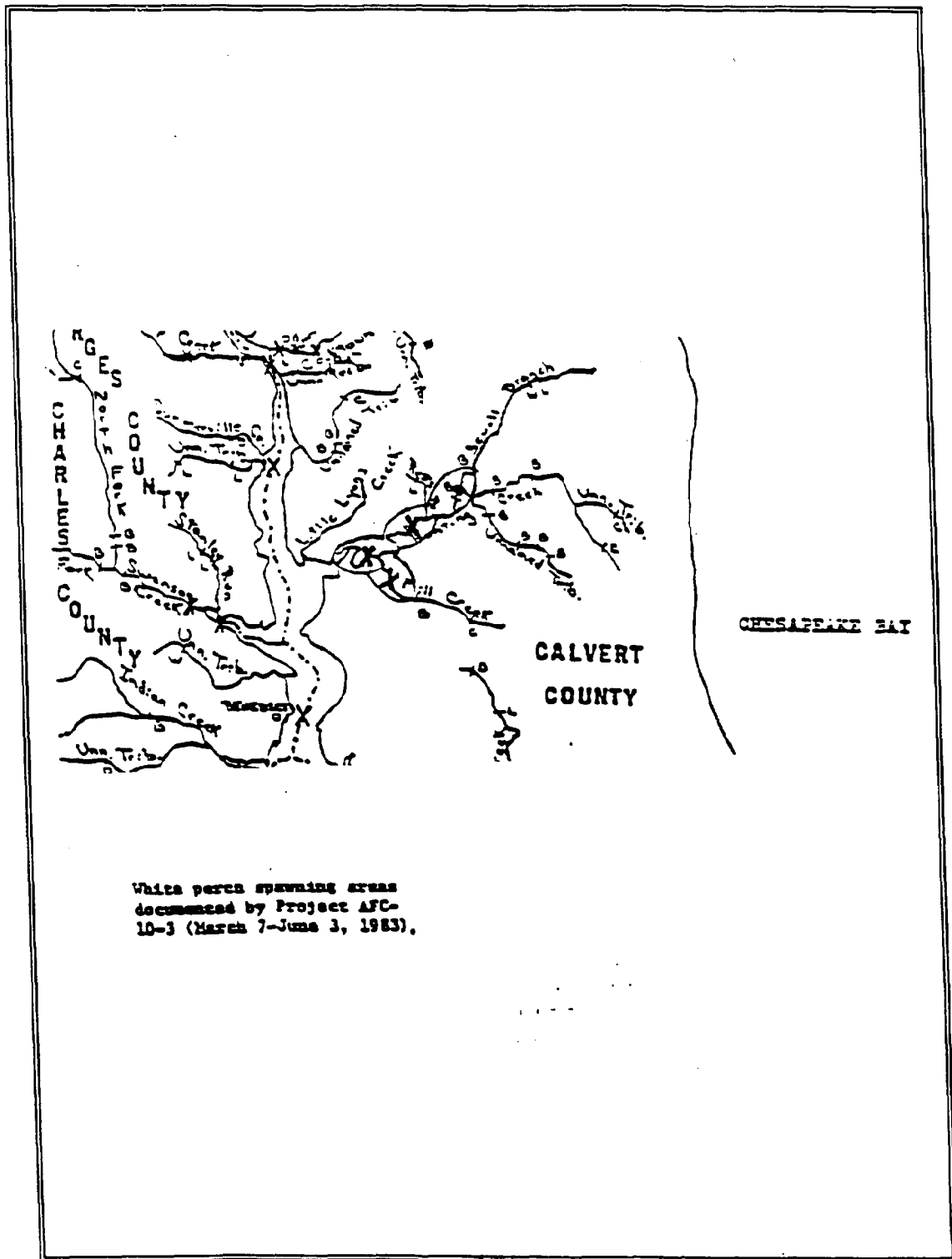


Figure 12 White Perch Spawning areas (O'Dell & Mower, 1984).

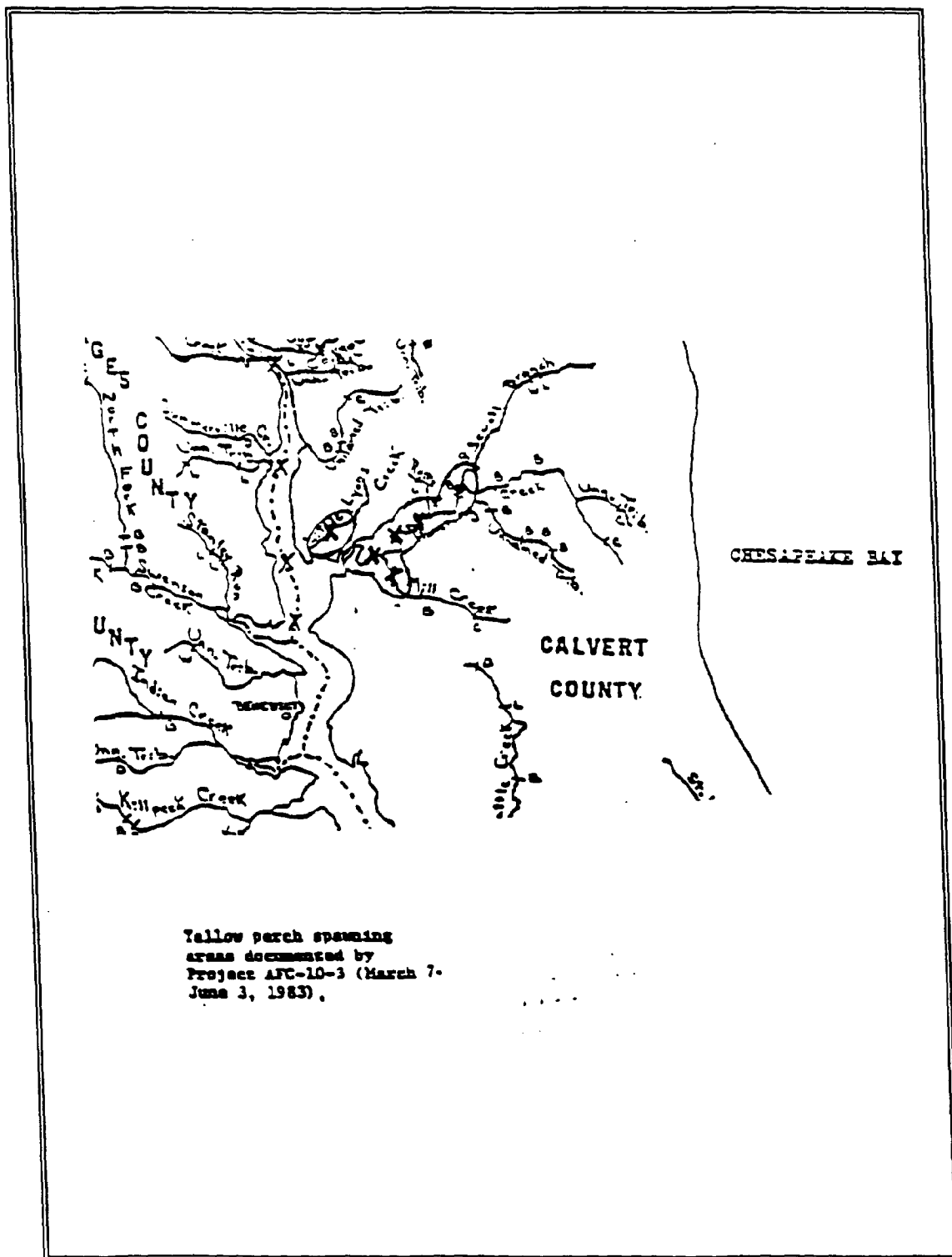


Figure 13 Yellow Perch Spawning areas (O'Dell & Mower, 1984).

Table I. Compiled Anadromous Fish Survey Data for Calvert County (DNR, 1984).

Stream Sampled	Station Number	Stream Mile	Stream Character	Type of Sampling	Salinity Range(ppt)	Species Collected
Hunting Creek	1	1.6	Tidal	Plankton	.10-6.5	H?,WP!,YP!
	2	3.4	Tidal	Plankton	.10L-.34	YP!
	3	4.6	Tidal	Plankton	.10L-.28	WP!,YP!
	4	6.0	Fluvial	Plktn.net	.10L-.10L	WPe,YPe
	5	6.1	Fluvial	Plktn.net	.10L-.10L	
Mill Creek	1	0.5	Tidal	Plankton	.10L-.34	WP#,YP!
Sewell Branch	1	2.1	Fluvial	Plktn.net	.10L-.10	
Little Lyons Creek	1	0.5	Tidal	Plankton	.28-7.50	YP!
L	-	less than				
H?	-	Herring either Alewife or Blueback unidentified due to egg/larval documentation only.				
WP	-	White Perch				
YP	-	Yellow Perch				
Plankton	-	Towed plankton net				
Plktn.net	-	Stationary plankton net				
!	-	Larvae collected				
@	-	Adults collected				
#	-	Eggs collected				

Data was compiled directly from O'Dell, J. and Mowrer, J.'s (1984) Survey and Inventory of Anadromous Fish Spawning Streams and Barriers in the Patuxent River Drainage report from the Maryland Department of Natural Resources, Tidewater Administration, Fisheries Division pages 44-51,A2-A4.

[FOREST COVER]

The CCCP recognizes the importance of forest cover in reducing runoff, inducing groundwater recharge, minimizing flooding, reducing erosion and sedimentation and in providing shelter and food for numerous species of wildlife. During January of 1993, Calvert County adopted a Forest Conservation Program which was enacted to provide for the retention of existing forest cover while allowing development to occur.

The Calvert County Critical Area Program, Calvert County Forest Conservation Program and mandatory cluster provision of the Calvert County Zoning Ordinance all recognize the importance of large blocks of contiguous forests and riparian forests. These areas are classified as potential Forest Interior Dwelling Bird Habitat. Riparian forest has been defined as forested land, 300 feet in width or greater, adjoining a body of water. Continuous blocks of 100 or more acres are considered large block forests. These same programs also address the importance of maintaining greenways or habitat corridors. Relative to Hunting Creek, the Natural Heritage Program, Department of Natural Resources has expressed in writing the necessity of preserving these types of forested areas.

Calvert County is in the process of updating our forest cover maps from the information being provided by the Forest Cover Inventory developed by DNR, Forest, Park and Wildlife Service.

CUMULATIVE IMPACT ASSESSMENT

WETLANDS

As was stated earlier, Calvert County is pursuing the concept of a communication link between the County and wetland permitting agencies regarding the location and extent of wetland filling and mitigation within the Hunting Creek Watershed. This information would enable the County to amend corrections to its mapping efforts and provide data necessary to observing the effectiveness of this Plan.

In 1991, a wetland assessment was conducted in one tributary of the Hunting Creek watershed that lies within the Prince Frederick Town Center (Appendix B). This project is the only official wetland field verification that has been conducted by the County for this watershed outside of wetland studies conducted with road plans in the Town Center (available at the County).

WATER SUPPLY

Ground water usage in Calvert County is confined mainly to residential and small commercial units. Exceptions are the industrial demands of the Calvert Cliffs Nuclear Power Plant and the Cove Point LNG Plant. To date, the water reserve of the various aquifers has been more than sufficient to meet the daily requirements of the County. Specific capacities (gpm/ft) of the two major formations (Nanjemoy and Aquia Greensand) range from 0.6 in the north to 2.0 in the south. In the extreme southern tip of the County, specific capacity may range up to 5.0. Thus based on the successful experience to date with the ground water reserves, Calvert may expect to derive its water supply from ground water resources during at least the design period (up to year 2000) and most likely even further. However, the full extent of the ground water resources will not be known until the studies of the Magothy, Piney Point and Aquia aquifers are completed. For the purposes of this plan, it can reasonably be assumed that there are ample supplies of ground water which are of satisfactory chemical quality for most uses.

Water quality in the aquifers lying beneath Calvert County is relatively good and in most cases it is suitable for consumption without treatment (DNR, 1987). Regulations governing the quality of drinking water in the State of Maryland are published as COMAR 10.17.03. The regulations set maximum contamination levels (MCL's); establish the monitoring frequency for certain bacteria, radiation, organic and inorganic chemicals; establish reporting procedures and require public notification in event of MCL violation by water suppliers as prescribed by the Federal Safe Drinking Water Act (WSP, 1990).

Few problems have been encountered in the County with reference to the quantity and quality of potable water available. Ground water is used exclusively for this purpose. There are in scattered instances of traces of H_2S odor, iron and other minerals in the water. Removal of these traces is practical and feasible (WSP, 1990).

A greater concern exists in the demand placed on these aquifers. Water drawing permits issued by the Water Rights Division of DNR, increase every year. Table II provides the data on water drawing permits issued since 1986. Water is being removed from the aquifers at a rate greater than the aquifers ability to replenish itself. This results in "drawdowns" in the water levels within the aquifer (Chapelle & Drummond, 1983). According to a digital simulation run by DNR, by the year 2000 based on 1980 pumpage, the water levels in the Piney Point/Nanjemoy aquifer in the region of Prince Frederick could drop as much as 10 feet (see Figure 14). Based on that same pumpage, water levels in the Aquia aquifer could drop 15 to 20 feet by the year 2000 (see Figure 15). Even a single user of the Aquia aquifer may cause "drawdowns." Assuming Chalk Point Power Plant pumps 0.5 million gallons per day for 10 years, levels in the Aquia aquifer could drop as much as 30 feet for

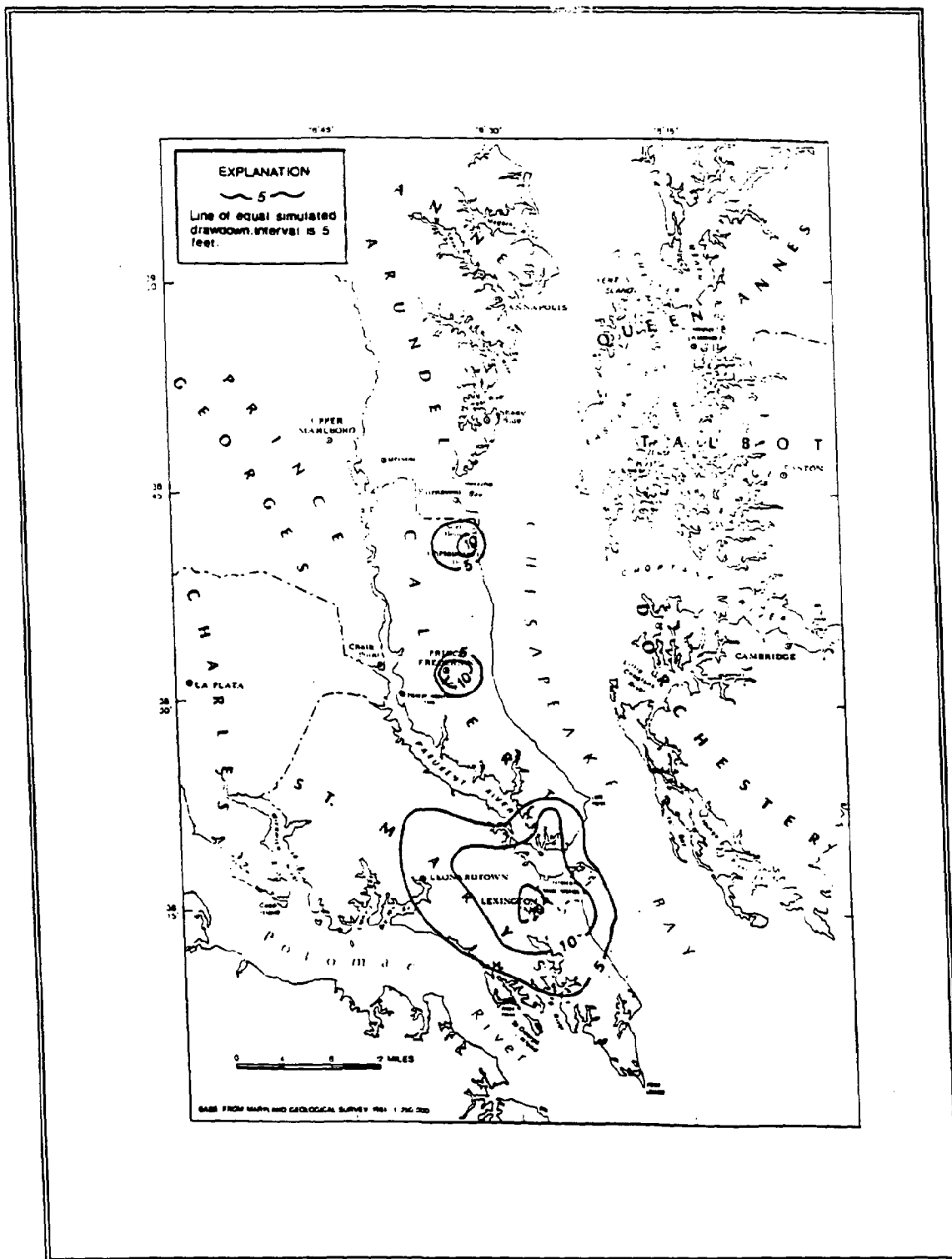
residents in the Hunting Creek region as demonstrated in Figure 16 (Chapelle & Drummond, 1983).

The League of Women Voters gathered materials on the County's water supply and petitioned the Commissioners to form a Water Board for Calvert County. This Board, composed of citizens and staff, meets periodically to discuss and outline procedures for the conservation and protection of the County's groundwater resources. The Board has identified several concerns and suggestions:

- 1) Failing septic systems in some areas pose possible groundwater contamination and health hazards.
- 2) Need increased public education on use and care of such systems.
- 3) The County lacks a back-up plan for ground water supply in case of emergency.
- 4) Maintenance of wells should not be a problem, but there is a need for public education.
- 5) Location and abandonment of old wells on property needs regulation. Should be abandoned in conjunction with demolition permits or construction of new well permits.
- 6) Need formal performance restrictions on drilling companies. Also, spot check on well grouting.
- 7) Roll of small public systems in areas of small lots.
- 8) Establish set policy to determine whether individual or community wells are used where clustering is required. Pros and Cons.
- 9) All large usage applicants be required to use deeper aquifers, leaving the upper aquifers for residential use only.
- 10) Should Calvert County establish Well Head Protection areas now?
- 11) Need increased study of impact by the Planning Department and Developers before projects are begun.
- 12) Use of recycled water in both public and residential areas.

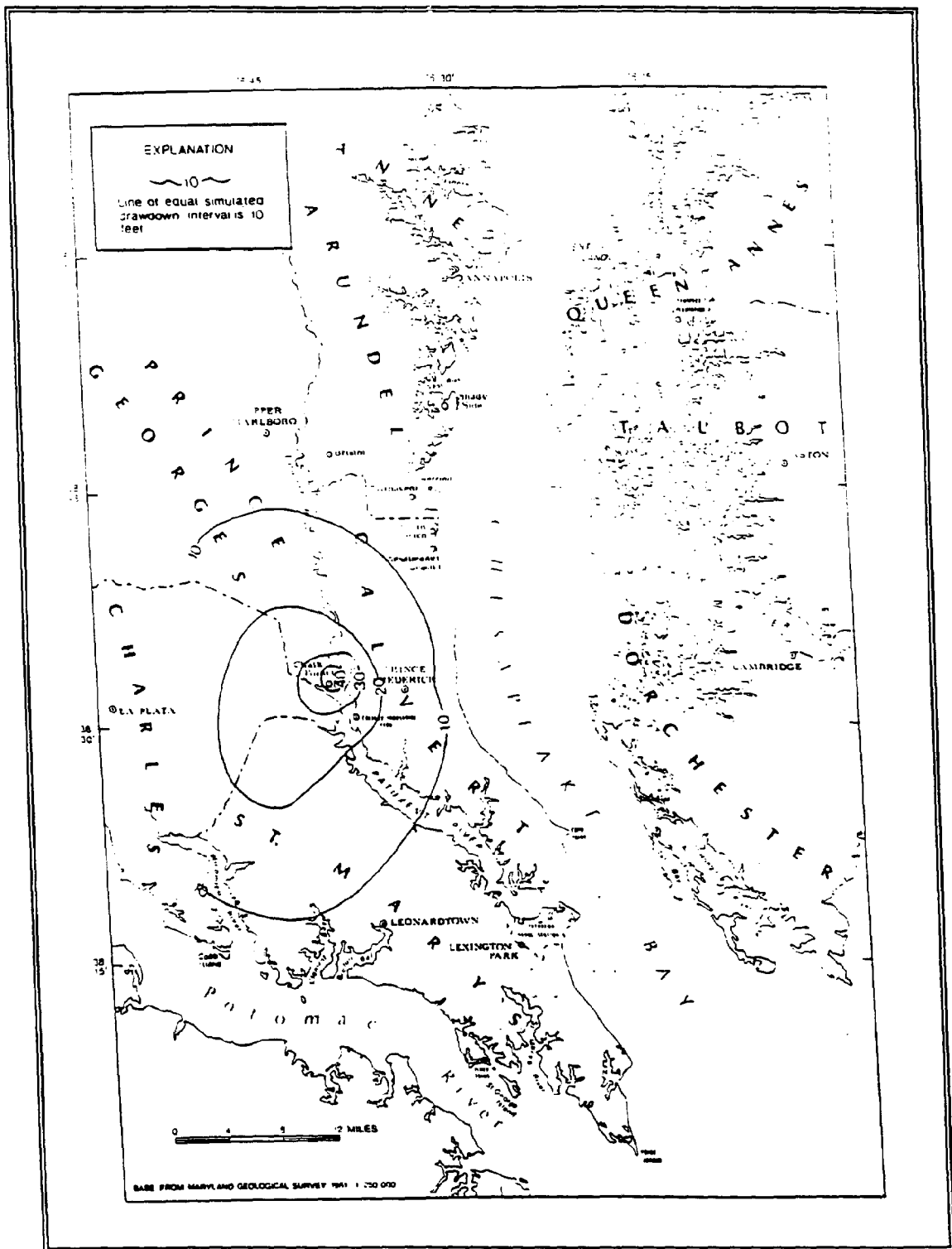
Table II. Water Drawing Permits.

Water Drawing Permits Hunting Creek Region Calvert County, Maryland									
N. Grid	E. Grid	Permit #	Owner's Name	Mean GPD	High GPD	Use(1) Aquifer	Use(2)	1(2)	Date
261	916	CA59G004	JOHN LORE'S LAUNDROMAT	3000	4000	107 124C			195912
282	910	CA66G007	PATUXENT CHURCH	300	700	104 124C			196602
283	919	CA70G005	CA CO BOARD OF EDUCATION	20000	40000	104 125B			197003
280	916	CA73G003	CA CO BOARD OF EDUCATION	200	300	104 124C			197208
262	922	CA73G005	CA CO BOARD OF EDUCATION	7400	20200	104 125B			197208
260	917	CA73G008	CA CO BOARD OF EDUCATION	14000	22000	104 125B			197208
286	910	CA74G008	HUNTINGTOWN VOL FIRE DEPART.	1200	2000	103 125B	401	95	197406
262	915	CA81G011	BLANKENSHIP*ROBERT A.	300	500	103 124C			198109
266	918	CA83G005	WEBER*CHARLES	500	1000	103 124C			198305
264	915	CA89G005	COX*E LEROY,MYRTLE G.& JAMES L	400	750	103 125B			198404
264	915	CA87G008	CA CO NURSING CENTER	7500	10000	104 125B	307	50	198404
260	917	CA84G008	KING*BOYD	300	500	103 124C			198407
264	914	CA85G003	SOUTHERN MARYLAND ISLAMIC	300	500	104 124C			198503
286	910	CA85G002	BRENNAN*EDWARD	800	1200	103 124C			198503
265	916	CA85G013	CA CO BOARD OF EDUCATION	4000	5500	104 125B			198508
263	926	CA85G014	CALVERT LIGHTHOUSE TABERNACLE	350	450	103 124C			198509
273	912	CA54G001	KOSLOWSKI*THOMAS E.	300	500	103 124C			198512
273	913	CA75G005	D & S ELECTRIC COMPANY, INC.	1100	2200	103 124C			198602
257	909	CA75G002	CA CO BOARD OF EDUCATION	1000	5000	104 125B			198606
272	917	CA86G009	TAYLOR*WILLIAM	3000	5000	109 124C			198608
264	910	CA86G010	JEHOVAH'S WITNESSES, INC.	200	300	104 125B			198609
268	914	CA86G013	SUBAN*SILPA	500	800	103 124C			198610
275	912	CA77G002	HAWIT & RICHARD GHATTAS	1200	2000	103 124C			198702
276	910	CA59G001	CALVERT COUNTY COMMISSIONERS	5000	7500	101 124C			198704
276	910	CA59G101	CALVERT COUNTY COMMISSIONERS	15000	22500	101 125B			198704
286	910	CA87G004	HUNTINGTOWN VOL FIRE DEPART.	100	150	104 124C			198706
285	910	CA87G007	MARYLAND TOBACCO GROWERS	350	500	103 124C			198707
285	910	CA77G001	MARYLAND TOBACCO GROWERS	500	600	103 124C			198707
265	915	CA52G001	CALVERT MEMORIAL HOSPITAL	44000	75000	104 125B			198708
285	926	CA87G010	CALVERT COUNTY COMMISSIONERS	200	400	104 124C			198709
265	915	CA77G014	WEEMS*GEORGE J.	800	1200	103 125B			198712
284	912	CA88G001	GIBSON*DENNIS	300	500	103 124C			198804
261	910	CA88G007	SPARROW*DOUG	3000	6000	109 124C			198810
260	916	CA88G011	FREESTATE COMMUNICATIONS, INC.	300	400	103 124C			198812
275	912	CA67G006	CALVERT COUNTY DAY	3000	4000	104 124C			198812
273	913	CA89G009	HUDSON*JOHN	300	500	103 125B			198906
273	912	CA89G010	HENDRICKS*RONALD	500	800	103 124C			198906
266	913	CA89G013	BEAVERS*DIANA	1000	1500	104 125B			198906
264	915	CA90G002	ALRIGHT*H.H.	1500	2000	103 124C			199002
263	915	CA90G011	RIVERA*MODESTO S.	300	500	103 124C			199011
268	911	CA90G009	BOWEN*DOUGLAS R.	200	300	103 124C			199012
257	910	CA77G016	CALVERT COUNTY COMMISSIONERS	33000	45000	104 125B			199102
275	915	CA81G010	CHRISTIAN BIBLE CENTER	300	500	104 124C			199109
274	921	CA91G011	CASSELL*DILLARD	500	800	107 124C			199109
267	913	CA81G015	ERSOY*OSMAN E.	300	500	103 124C			199110
282	917	CA91G009	JCH PROPERTIES, LIMITED	51000	85000	107 125B			199112
259	916	CA74G005	CA CO BOARD OF EDUCATION	205000	300000	101 125B			199112
264	914	CA79G005	FRANKEL*BERNITT	2000	3400	103 125B			199201
267	903	CA82G002	PADGETT*HASCOMER & MARLENE	6800	10200	109 125B			199202
286	910	CA91G023	AMERICAN LEGION POST #85	500	800	104 124C			199203



Figure

14 Drawdowns in Piney Point/Nanjemoy aquifer (Chapelle & Drummond, 1983).



Figure

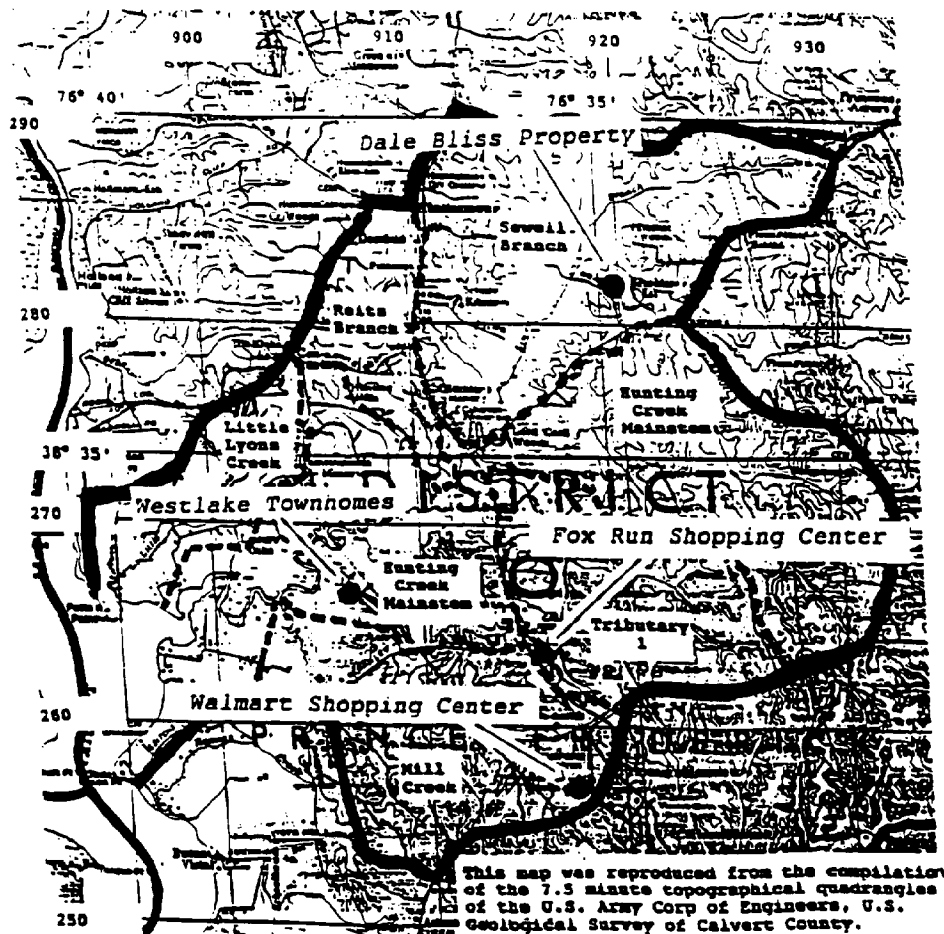
16 Drawdowns in Piney Point/Nanjemoy aquifer as a result of Chalk Point Power Plant (Chapelle & Drummond, 1983).

[MONITORING]

A summary of the monitoring projects within the Hunting Creek watershed has been completed by a representative of the Tri-County Council for Southern Maryland (Appendix D). Information regarding the Maryland Department of the Environment's (MDE) water quality and macroinvertebrate sampling site is currently being compiled.

SEDIMENT EROSION

At the request of the department of Planning and Zoning, Maryland Department of the Environment (MDE), Sediment and Stormwater Management collected data on recent sediment pollution cases in the Hunting Creek watershed. Fox Run Shopping Center experienced very severe problems around July 3, 1990. Walmart Shopping Center contended with moderate problems around August 13, 1991. The Dale Bliss Property resulted in moderate problems between February 2 to March 12, 1991. And unfortunately, the Westlake Townhomes experienced moderate to severe sediment problems around June 8, 1990 and September 17, 1991. The locations of these sites may be viewed in Figure 17. MDE has agreed to provide the County with further violations should they occur.



Figure

17 Sediment pollution cases in the Hunting Creek watershed.

PROTECTIVE MEASURES

WETLANDS

Tidal wetlands are all within the Critical Area and require a 100 ft buffer which can be extended for slopes greater than 15%, etc. Other provisions of the Critical Area regulations such as limits to clearing, mitigation for clearing, limits to impervious surface, required reduction in pollutants and stormwater management requirements are also intended to maintain or improve water quality. Blue line streams in the Critical Area receive same 100 ft or extended buffer as for tidal waters. Blue line streams outside of the Critical Area require a 50 ft buffer with extension of the buffer for slopes greater than 25%. Non blue line streams or nontidal wetlands inside or outside of the Critical Area require 50 ft. buffers. Exceptions for crossings and stormwater management are provided. Reduction in these buffers can be granted under certain circumstances but are rarely granted during subdivision of land.

Filling or destruction of wetlands may only occur if appropriate federal and State permits are obtained. Concept Plan approval from the Planning Commission for site plans shall be obtained before submitting for these permits for any filling of wetlands not permitted as either a road crossing and stormwater management. These permits will be required before final subdivision or site plan approval. Substantial alterations to subdivision or site plans that result from the federal and state permitting process, will make void existing preliminary approvals and will require resubmittal of the revised site plan or subdivision to the Planning and Zoning office for review by staff and reconsideration by the Planning Commission for preliminary approval. Land will not be subdivided in a manner that requires filling of wetlands for any activities except road crossing and stormwater management. Wetlands that are filled after receiving federal, state and county approval, will no longer be defined as wetlands and will not require wetland buffers.

For development activities on existing lots that require federal or state wetland permits and do not require submittal of a site development plan, federal and state wetland permits will be required prior to issuance of grading or building permits. Filling of wetlands for the construction of single-family detached residential dwellings will not be allowed. In addition, filling of wetlands in the 100 year flood plain as depicted on the FIRM maps or indicated as "My" soils on the Soil Survey Maps, for other than road crossings and stormwater management, will not be allowed.

If it is determined prior to final approval, that more wetlands exist on the site than originally submitted, then the subdivision, site plan, building permit or grading permit will be resubmitted to reflect the additional wetlands and appropriate wetland buffers. If filling of these additional wetlands is being proposed, then any preliminary approval given by the Planning Commission will be made void and the revised

project will be resubmitted to the Planning and Zoning office for review by staff and reconsideration by the Planning Commission for preliminary approval.

Wetlands will be defined and delineated by qualified professionals. For all site plans, subdivisions, and grading and building permit applications that pertain to sites that have wetlands on them, the wetlands and appropriate buffers shall be placed on the plats and a wetland report submitted to confirm the delineation.

These wetland regulations are rather strong and the major potential for wetland loss, other than as a result of road crossings or stormwater management, would be from the filling of wetlands for the construction of multifamily housing in the Town of Prince Frederick or from site plans in Prince Frederick, Huntingtown or other institutional uses in the watershed. However, it should be noted that filling of wetlands in the 100 yr. flood plain (including "My" soils) is not allowed.

Pollution entering the watershed is from both point and non-point sources. There are very few potential point sources of pollution in the watershed. These could include subsurface runoff of leachate of the completed County municipal, capped but unlined landfill in Barstow and the slow rate land application sewerage treatment plant in the same area. The sewerage treatment plant which utilizes spray irrigation should not pollute either surface or groundwaters. Non-point source runoff of sediment and nutrients, acid rain and atmospheric deposition of nitrogen and are the other potential sources of pollutants.

The main issues relative to wetlands are loss of wetlands and wetland function through filling or pollution, reduction in wetland buffers by the Planning Commission or Board of Appeals, timber harvesting and farming activities in wetlands and the effectiveness of wetland mitigation.

The County has established a strong protection policy for wetlands and waterways. Land application of sewerage is the preferred method of treatment and is used in the treatment of municipal sewerage from Prince Frederick. The plant is located within the Hunting Creek Watershed. In January, 1993 and based on the recommendations of the small-lot subcommittee, the Board of County Commissioners of Calvert County enacted new regulations that require chambered septic tanks to be used for all new and replacement septic tanks and that all lots must have one primary and two secondary septage recovery areas in order to receive Health Department approval to construct a home. If and when these chambered tanks fail, the septage backs up into the house rather than spilling into the drainfield and eventually overland to our waterways.

FLOODPLAINS

Regulations governing development in and adjacent to the 100 yr. flood plains are designed to protect the flood plain values described above as well as property and lives of residents. Activities in the flood plain are regulated via the Calvert County Zoning Ordinance, Calvert County Flood Management Ordinance, and the Calvert County Subdivision Regulations.

The main issues relative to flood plains are loss of wetland flood plains which is discussed under the section on wetlands above and loss of life and property during flood events.

The County has established a successful flood management program which directs most new growth out of the flood plain and where allowed, requires appropriate construction techniques. The County has participated in the Community Rating System developed by the Federal Emergency Management Administration (FEMA) to promote better flood management and has recieved a decrease in flood insurance rates for County citizens based on our flood management program. Our regulatory flood plain maps have been revised to show extension of the 100 yr. flood plain beyond the FIRM maps based on the presence of "My" soils.

WATER SUPPLY

Providing water services to present users and expanding that service to meet the needs of new users involves significant public expenditures. In the long run, costs of planning, designing and constructing new facilities may be reduced by a number of techniques to delay, or lengthen the interval between major water facility expansion. Such techniques include the provision of a reasonable excess capacity to meet later expansion needs, and adoption of policies to limit population growth (WSP, 1990).

Another significant technique for reducing expansion costs which has recently received serious attention in this country is demand modification. The gallons of water a system must collect, treat and distribute is determined by the number of users and the gallons consumed by each user. Demand modification techniques would include approaches to reduce the number of gallons used by each consuming unit (WSP, 1990).

In 1988, Calvert County initiated a Comprehensive, County-wide Water Conservation Program. The program is designed to reduce the per capita consumption of water by initiating a public information/public awareness campaign. In addition, all new development within any sanitary district or in any community system owned and operated by the County must use water conserving devices in accordance with the County Water and Sewer Plan (WSP, 1990).

Finally, the County approved a County-funded retro fit program for the Prince Frederick Sanitary District to reduce consumption and extend available resources. More efficient water use resulting from this plan would reduce water system expansion costs, reduce costs in related services such as sewerage systems, and be consistent with national policies of resource conservation. While Calvert County does not foresee a shortage of potable water, the potential economic and conservation benefits of demand modification indicate that careful consideration should be given measures to accomplish such modifications in revisions of County building and plumbing codes and related policies and regulations. Per capita consumption is expected to continue to increase as the County makes the rural to urban transition; however, as this transition is accomplished, demand modification may be one method of stabilizing or reducing per capita water consumption in areas served by community water systems (WSP, 1990).

It is necessary to obtain a well drilling permit from the Local Health Department (Department of Environmental Health and Hygiene) for individual wells or for multi-use or community water systems of two or more lots. In addition, a groundwater appropriation permit must be secured from the Department of Natural Resources, Water Resources Administration for all extractions of water (including residential, commercial and industrial). Generally, there are two exceptions where an appropriation permit is not required; for farming purposes and domestic uses (residential, not in a subdivision) (WSP, 1990).

Application for a permit to drill a well must be submitted by a master well driller or well driver, licensed by the State Board of Well Drillers. Such permit is required for construction of every well and every test hole which the well driller intends to construct. Well construction work can not be started until a permit has been issued (WSP, 1990).

With certain exceptions, a permit issued by WRA is required prior to any appropriation or uses of waters of the State (includes both surface and under ground waters), or before construction of a building, plant, or structure which will appropriate waters of the State. The exceptions not requiring an appropriation permit include: Domestic use; Farm use; Use by any municipality for an approved public water supply system, for those uses of water in effect on July 1, 1969; Use of water in effect on January 1, 1934, if that use has not been abandoned; and Appropriation of water to be used for fighting a fire. For applications for appropriations in excess of 10,000 gallons per day, WRA will schedule and conduct a public hearing in the Courthouse, Prince Frederick, to receive comments from interested persons (WSP, 1990).

The holder of an appropriation or use permit may not transfer the permit without WRA approval. The permittee shall notify the Water Resources Administration of the name and address of the transferee accepts in writing all of the terms and

conditions of the permit. Details of the requirements for these permits are contained in Water Resources Administration Regulation 08.05.02, Groundwater Rules and Regulations (WSP, 1990).

HABITAT OF SPECIAL CONCERN

The main issue relative to protection of wildlife habitat, is loss of the habitat through destruction of the habitat, decrease in quality of the habitat or through increased disturbance adjacent to the habitat which prohibits its use. Relative to anadromous fish spawning in the Creek, water quality and temperature are the most important factors.

In the Critical Area (outlined in Figure 18), protective measures are provided for habitat districts for 1) threatened, and endangered species and species in need of conservation (includes bald eagles and certain tiger beetles); 2) plant and habitat overlays including natural heritage areas, State-listed species sites, locally significant habitats, and habitats for colonial nesting water birds and forest interior dwelling birds as well as waterfowl staging and concentration areas; and 3) anadromous fish propagation waters. Outside of the Critical Areas, provisions are made to recognize critical natural areas and provide protection for them.

Open water areas, around Hunting Creek, have been classified as Historic Waterfowl Staging and Concentration Areas. This restricts the construction of certain water-dependent facilities within these regions (see Figure 19).

The County has implemented its Critical Area Program and in January of 1993 the County's Forest Conservation Program, Resource Preservation Overlay and Mandatory Clustering provisions were implemented. Together these regulations provide a very effective tool for the preservation of open space and important wildlife habitat.

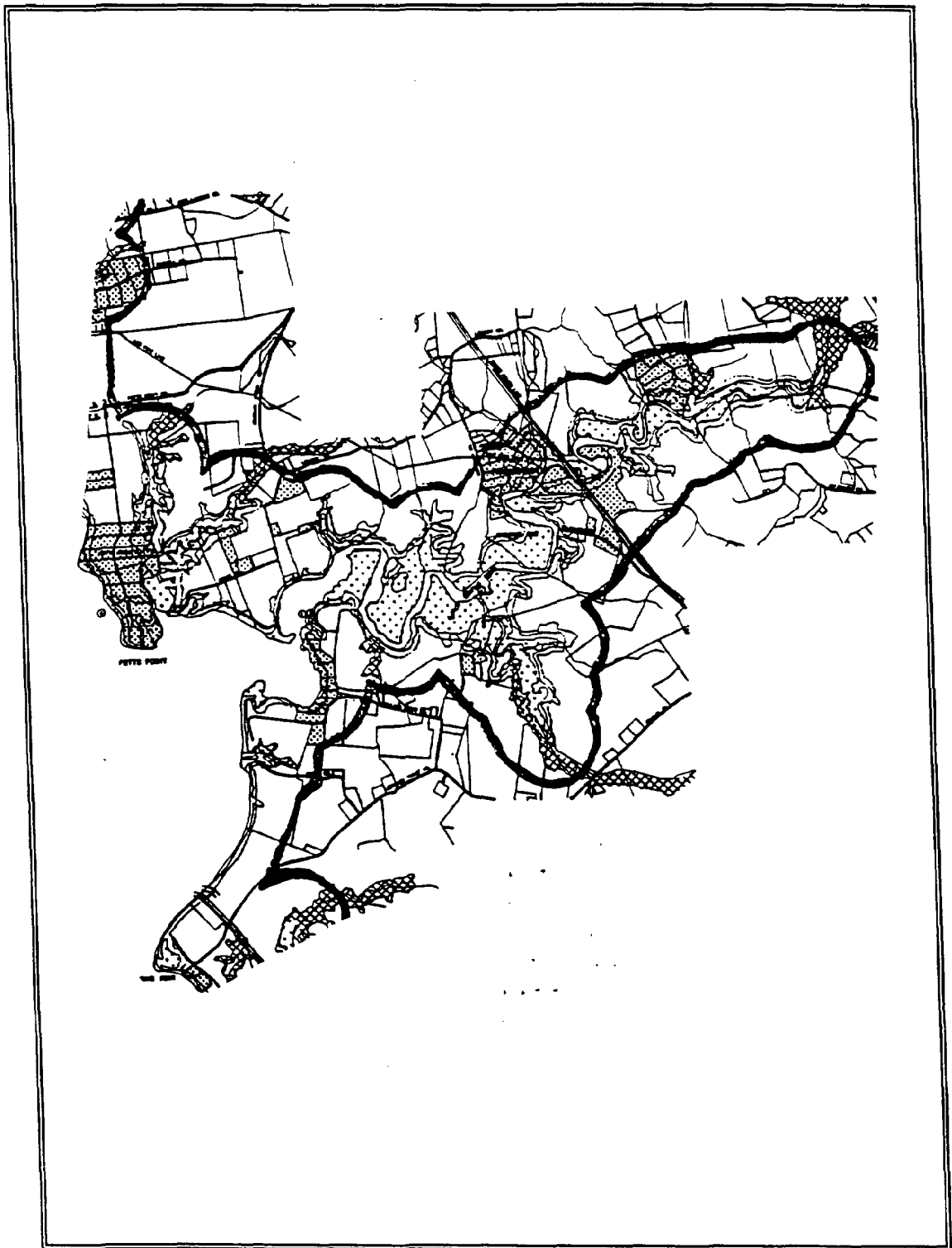
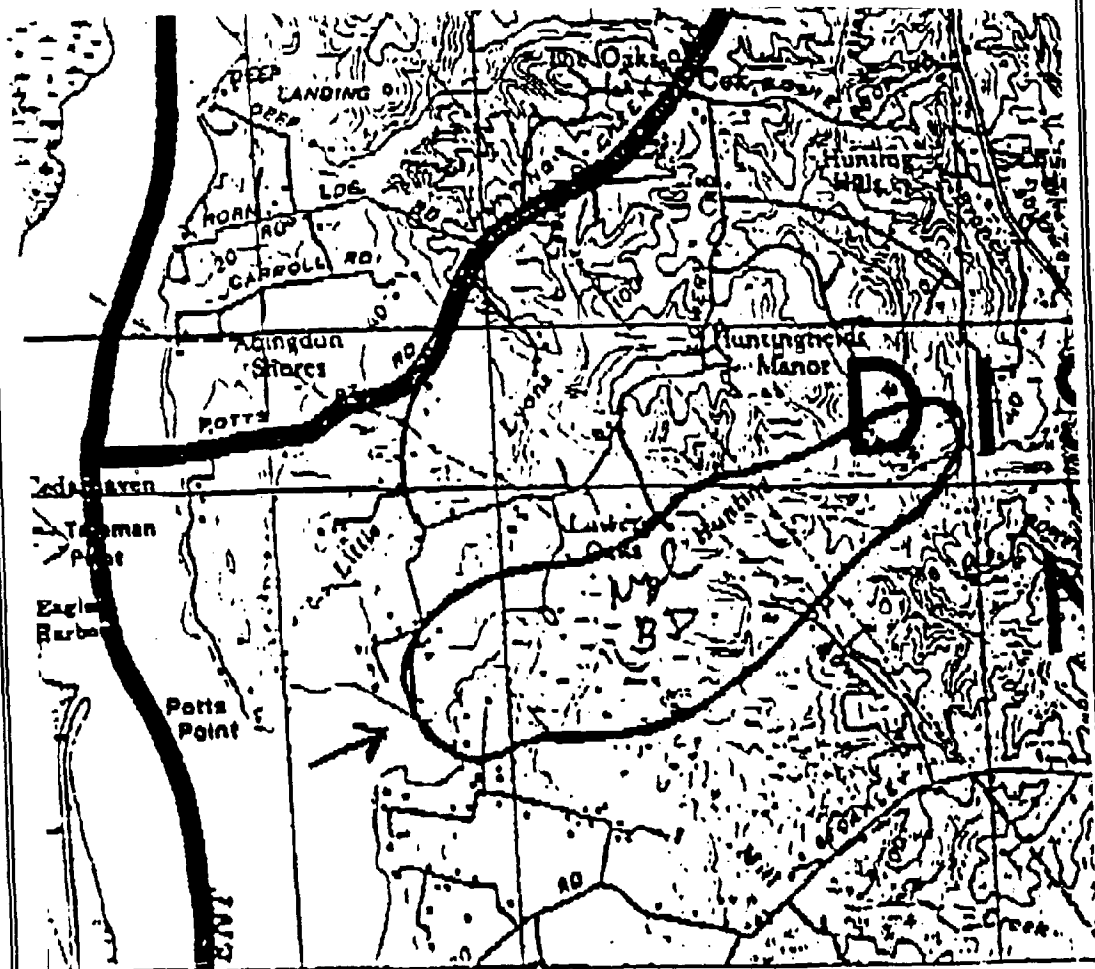


Figure 18 Delineation of the 1000' Critical Area Line.



Area in Hunting Creek - Mallards and Black Ducks.

Figure 19 Waterfowl Staging and Concentration Area.

FOREST COVER

Protective measures for maintaining the County's existing forest cover are based on general conservation issues. Relative to forest conservation these are: the rapid loss of forest in the watershed and Calvert County in general, the disruption of large areas of contiguous forest or riparian forest which is important habitat to forest interior dwelling birds, impacts of forestry activities, loss of champion trees, and loss of mature forests.

In the Critical Area, within 1000 ft of tidal waters, tidal wetlands or heads of tide, the Critical Area Program regulates forest conservation and provides the most stringent restrictions on clearing and requirements for reforestation. Within the Critical Area portion of the Hunting Creek Watershed, where there is no intensely developed areas, clearing relative to development is restricted to a maximum of 30% of the lot or parcel area or 6000 sq. ft., whichever is greatest, and at least 100% replacement is required. If the forest area qualifies as a plant and wildlife habitat protection area, then a habitat protection plan must be developed cooperatively between the applicant, the County and the Department of Natural Resources before a development plan can be approved. Wetland buffer areas are also protected. These buffer areas are 100 ft. (which can be extended for slope) from tidal waters, tidal wetlands and tributary streams and 50 ft. from nontidal wetlands.

Outside of the Critical Area, the Forest Conservation Program (FCP) regulates forest removal and retention. Based on zoning, certain retention thresholds are set. Depending on the amount of clearing in relation to the threshold, no, 100% or greater than 100% replacement of forest is required. Priorities for forest retention are set forth in the FCP and include forested wetlands and wetland buffers, floodplains, steep slopes, large contiguous forest areas, endangered species habitat, etc. Wetland buffers are 50 from blue line streams with extensions for steep slopes and 50 ft. from non-blue line streams and wetlands.

The cluster provisions of the Zoning Ordinance direct development away from buffer areas and large contiguous tracts of forest. These provisions apply inside and outside of the Critical Area.

The County has implemented its Critical Area Program and has established a Critical Area Reforestation Evaluation (CARE) Committee to direct reforestation efforts in the Critical Area. In 1992, the County received an award for innovation from the Chesapeake Bay Local Government Advisory Committee for its Critical Area Reforestation Program. In January of 1993 both the County's Forest Conservation Program and Mandatory Clustering provisions were implemented. Together these regulations provide a very effect tool for forest conservation.

OPEN SPACE

Forests, farms, wetlands, stream valleys, cliffs, wildlife, parks and people all need space in Calvert County and there are only 140,000 acres to share. The trend has been for people to claim first choice of available space destroying or not providing for the others in the process. But in recent years, a new *land ethic* has begun to emerge. We have begun to realize that it is not only possible but preferable to protect the natural resources of the water and the land. We do this, not from a sense of heavy moral obligation, but because we know that these resources are among the things we value most and enjoy (LPOSP, 1989).

The purpose of the open space plan is to provide a policy framework for the preservation and management of:

1. Unique and sensitive natural areas within Calvert County and in particular within the Chesapeake Bay Critical Area,
2. Productive forest land,
3. Productive agricultural land, and
4. Recreational open space and facilities.

There is still a great deal of open space suitable for farming, forestry, wildlife habitat and recreation in Calvert County, but the trend has been for residential development to consume an increasingly larger share of total land area. As this trend continues, the amount of space available for farming, forestry, natural habitat and recreation will continue to decline (LPOSP, 1989). Based on preliminary evaluation of these trends, the citizens of Calvert County are attracted and remain within the County due to the rural character presented by the County's current and past appearances.

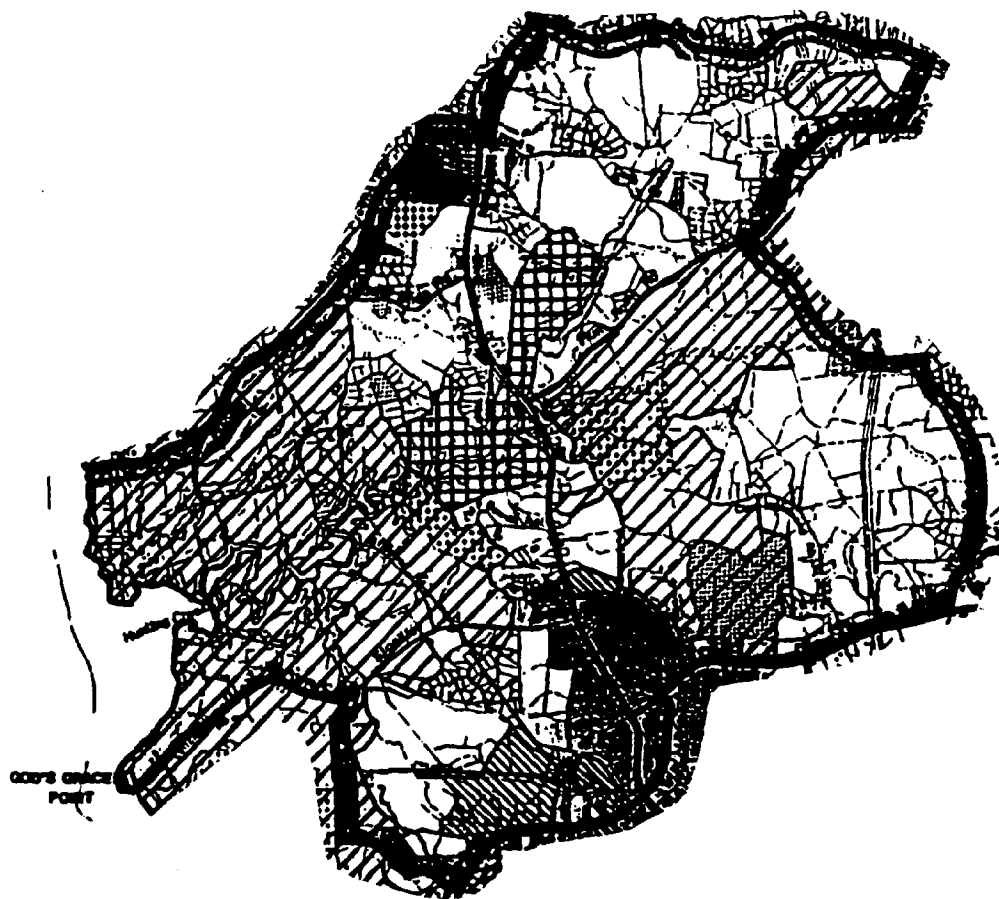
One of the tasks of this project is to recommend revisions to land use regulations and local governmental activities that would promote the objectives of the plan and facilitate its implementation. Calvert County has been working on a number of regulations that will help protect the environment of Hunting Creek as well as that of the entire County.

These regulations, designed to both preserve rural character and protect the environment, were approved by the Board of County Commissioners and implementation began January 1, 1993. The new regulations include mandatory clustering in rural subdivisions, changes to our Agriculture Preservation Program including changes to the transfer development rights (TDR) regulations, and adding a new overlay zone to our rural zoned land.

The overlay consists of three districts: Resource Preservation (RP), Farm Community (FC) and Rural Community (RUC). In the RP and FC districts, during subdivision 80% of the parcel must be preserved in "open space", no transfer zones are allowed and sending of transfer development rights from these areas is

encouraged. In the RUC district, during subdivision 50% of the parcel must be preserved in "open space" and transfer zones are allowed.

These regulations should result in farm land and forest land being preserved due to transfer of development rights out of the RP and FC areas and due to decreased land development (maximum 20% developed in the RP and FC districts; maximum developed 50% in the RUC district) if subdivided. Though density can be increased in the RUC areas, only 50% of the area can be developed. The reduced development area will result in reduced runoff. The increased "open space" will decrease non-point source pollution and preserve farm land, rural character, contiguous forested areas and wildlife habitat. The overlays of the three districts are provided in Figure 20, as they pertain to the Hunting Creek Watershed.






-  RESOURCE PRESERVATION DISTRICT
-  FARM COMMUNITY DISTRICT
-  RURAL COMMUNITY DISTRICT

Figure 20 Overlays of new zoning districts.

FARM PLANNING

The objective of the Soil Conservation Service (SCS) Hunting Creek Watershed Project is to demonstrate the positive results of soil conservation and water quality plans, in addition to Best Management Practices (BMP) installation, on water quality in the Hunting Creek Watershed. This project will result in an accurate representation of the influence of agricultural programs offered through the Calvert Soil Conservation District on non-point source pollution in the overall Patuxent River Watershed.

The Hunting Creek Watershed is comprised of 18,569 acres of land, of which 10,209 acres (55%) designated as agricultural and forest lands. There are 4,591 acres of cropland and pasture contained within 182 individual parcels of land. Presently 92 of these agricultural parcels have farm conservation plans but 42 of these parcels need to have updated farm plans because they are greater than ten years old. The other 90 agricultural parcel owners, who have never had a farm conservation plan, need to be approached to explain to them the benefits of a soil conservation and water quality plan and possible cost sharing programs being offered in the installation of BMP's. Their contribution to the whole watershed project is essential in showing that soil conservation plans, which have been in place for the past 40 years, have made a significant impact on reducing the load of non-point source pollutants (sediment, nutrients, etc.).

To assist in the implementation and update of new and old farm conservation plans, Calvert Soil Conservation District received an EPA grant through the Maryland Department of Agriculture to hire a farm planner to specifically address the objectives of the project. This planner was hired in January 1993, to work on the SCS Hunting Creek Watershed Project.

The funds provided, allow the farm planner to develop soil conservation and water quality plans on 3,663 acres, or about one half of the updated plans and unplanned agricultural land in the Hunting Creek Watershed. Funds are being pursued through the Environmental Protection Agency (EPA) and other supporting agencies to complete the other half of the project.

RECOMMENDATIONS

WETLANDS

1. Maintain the existing policy of strong County regulations for the protection of wetlands and waterways.

2. Conduct an analysis of wetland function to determine which wetlands are the most valuable.
3. Work with the Maryland Office of Planning and their Non-point Source Accounting and Assessment System to estimate the most important sources of non-point source pollution in Hunting Creek and to test the effectiveness of various land use controls and sensitive area protection measures in reducing non-point source pollution. Based on these results and recommendations from the Hunting Creek Watershed Task Force, make appropriate amendments to the Calvert County Zoning Ordinance and Prince Frederick Zoning Ordinance. The Calvert County Water and Sewerage Plan and the Open Space Plan may also have to be amended depending on the forthcoming recommendations.
4. Support the Calvert County Soil Conservation efforts to complete and update Farm Conservation Plans for all farms in the Hunting Creek watershed.
5. Identify from the wetland function model and location of rare, threatened and endangered species what land areas should be preserved and identify possible means for their preservation.
6. Develop a citizen education program to inform public of the value of wetlands and clean water and the individual's role in preserving wetlands and maintaining clean water.

FLOODPLAINS

1. Continue to implement and improve our flood management program.
2. Have the revised regulatory flood plain maps entered into our computer mapping system and officially adopted.
3. Work with the Army Corp of Engineers to conduct a flood plain study in all or parts of Hunting Creek to update our FIRM maps and regulatory flood plain maps and to provide information on projected flooding potential based on current zoning and full build-out.
4. Identify all structures currently in the 100 yr. flood plain in Hunting Creek and identify all flood plain areas in the watershed that are or will be preserved in open space.
5. Notify owners of structures located in the flood plain of the potential hazards and available protective measures that can be taken.

6. Identify any road crossings that may be impacted by flooding and plan corrective actions.

WATER SUPPLY

In the process of revising the Calvert County Water and Sewer Plan, the County is recommending the development of a well-head protection plan.

1. A possible amendment in this plan would require the capping of old or abandoned wells on site should a new well be drilled.
2. The amendments may include provisions increasing the required distances between the well and potential contaminants such as septic fields, impervious surfaces, storage tanks, etc.

These policies would prevent intrusions such as salt and pollutants into the confined aquifers and maintain the integrity of these aquifers in supplying quality groundwater.

HABITAT OF SPECIAL CONCERN

1. Work with DNR to develop an anadromous fish spawning stream plan for Hunting Creek. This plan would become part of the Hunting Creek Watershed Management Plan.
2. Identify the most functionally valuable wetlands in the watershed and work toward their protection and preservation.
3. Work with DNR to develop a habitat protection plan for the Waterfowl Staging and Concentration Area in Hunting Creek. This plan would become part of the Hunting Creek Watershed Management Plan.
4. Adopt protection measures for FIDs outside the Critical Area.

FOREST COVER

DNR has expressed the necessity in preserving riparian and large block forested areas in the Hunting Creek watershed. These areas are classified as potential Forest Interior Dwelling Bird Habitat. Riparian forest has been defined as forested land, 300 feet in width or greater, adjoining a body of water. Continuous blocks of 100 or more acres are considered large block forests. DNR also recommends Calvert County to maintain existing contiguous forested land and when development occurs,

provide for the connection of forested habitat areas.

1. Once the forestry information has been received from DNR in digital format, map the forest area for the watershed, determine its total area, and identify potential forest interior dwelling bird habitat on the map.
2. Expand the protection for FID habitat outside of the Critical Area.
3. Measure the rate of forest loss in the watershed.
4. Determine how much reforestation has occurred in the watershed.
5. Estimate the amount of forest harvest activity in the watershed and its potential environmental impact.
6. Promote reforestation efforts in the watershed.

IMPLEMENTATION

The basis for the following implementation schedule is the Patuxent Estuary Demonstration Project Phase II Planning Grant being supplied by the Maryland Office of Planning (Appendix C):

March 31, 1994	Revised Draft Hunting Creek Watershed Management Plan.
June 30, 1994	Draft Prince Frederick Watershed Management Plan with elements of the Hunting and Parker Creek Plans.
September, 1994	Wetland functional assessment for watershed.
December, 1994	Complete certification as a Wetland Watershed Management Plan by the Maryland Department of Natural Resources, Water Resources Administration.
FY 1995	Plan will go to public hearing and to the County Commissioners for adoption

REFERENCES

- ADC., Calvert County, MD. Street Map. Alexandria Drafting Company, 1979.
- CCCP., Calvert County Comprehensive Plan. Calvert County Department of Planning and Zoning, 1983.
- Chapelle, F.H. & Drummond, D.D., Hydrology, Digital Simulation, and Geochemistry of the Aquia and Piney Point-Nanjemoy Aquifer System in Southern Maryland. Report of Investigations No. 38. Maryland Department of Natural Resources, 1983.
- LPOSP., Land Presurvation and Open Space Plan. Calvert County Department of Planning and Zoning, 1989.
- NWL., National Wetland Inventory. U.S. Fish and Wildlife Service, 1981.
- Overbeck, R.M., Water Resources of Calvert County. Bulletin 8. Maryland Department of Geology, Mines and Water Resources, 1951.
- O'Dell, J. & Mower, J., Survey and Inventory of Anadromous Fish Spawning Streams and Barriers in the Patuxent River Drainage. Maryland Department of Natural Resources, 1984.
- SCS., Soil Conservation Service Soil Survey of Calvert County. Soil Conservation Service, 1971.
- WSP., Calvert County Water and Sewerage Plan. Calvert County Department of Planning and Zoning, 1990.

PARTICIPANTS

GOVERNMENT AND PUBLIC PARTICIPATION

FEDERAL

National Marine Fisheries Service
National Oceanic and Atmospheric Administration
Soil Conservation Service
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Service

STATE

Critical Area Commission
DNR-Forest, Park and Wildlife Service
DNR-TA-Coastal and Watershed Resources Division
DNR-WRA-Flood Management Division (dissolved)
DNR-WRA-NFIP Coordination
DNR-WRA-Nontidal Wetlands Division
DNR-WRA-Tidal Wetlands Division
DNR-WRA-Water Rights Division
MDE-Sediment and Stormwater Management
MDE-Water Quality Certification
Maryland Office of Planning

REGIONAL

Tri-County Council for Southern Maryland

LOCAL

Department of Economic Development
Department of General Services
Department of Public Safety
Department of Public Works
General public, organized citizen associations and citizen advisory groups
Hunting Creek Watershed Task Force

APPENDIX A

POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
LHS	49	HYSO-3	90221	2.07	0.06	0.01
LHS	17	HYSO-3	205329	4.71	0.14	0.02
LHS	10	HYSO-3	586377	13.46	0.40	0.07
LHS	40	HYSO-3	151369	3.47	0.10	0.02
LHS	58	HYSO-3	16352	0.38	0.01	0.00
LHS	4	HYSO-3	265512	6.10	0.18	0.03
LHS	55	HYSO-3	90635	2.08	0.06	0.01
LHS	36	HYSO-3	113357	2.60	0.08	0.01
LHS	24	HYSO-3	76880	1.76	0.05	0.01
LHS	8	HYSO-3	1425357	32.72	0.98	0.17
LHS	56	HYSO-3	42289	0.97	0.03	0.01
LHS	38	HYSO-3	60214	1.38	0.04	0.01
LHS	15	HYSO-3	2695253	61.87	1.85	0.32
LHS	7	HYSO-3	87493	2.01	0.06	0.01
LHS	5	HYSO-3	168512	3.87	0.12	0.02
LHS	1	HYSO-3	1279801	29.38	0.88	0.15
LHS	21	HYSO-3	313126	7.19	0.21	0.04
LHS	TOT	HYSO-3	7668077	176.03	5.26	0.91

WC - Watershed Code WN - Wetland Number WT - Wetland Type

POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
LHS	22	HYSO-4	105406	2.42	0.07	0.01
LHS	31	HYSO-4	1065553	24.46	0.73	0.13
LHS	18	HYSO-4	137721	3.16	0.09	0.02
LHS	50	HYSO-4	104857	2.41	0.07	0.01
LHS	20	HYSO-4	139369	3.20	0.10	0.02
LHS	33	HYSO-4	2263550	51.96	1.55	0.27
LHS	43	HYSO-4	65819	1.51	0.05	0.012
LHS	9	HYSO-4	405537	9.31	0.28	0.05
LHS	13	HYSO-4	370017	8.49	0.25	0.04
LHS	45	HYSO-4	187809	4.31	0.13	0.02
LHS	26	HYSO-4	1378210	31.64	0.95	0.16
LHS	6	HYSO-4	701806	16.11	0.48	0.08
LHS	28	HYSO-4	128224	2.94	0.09	0.02
LHS	37	HYSO-4	737790	16.94	0.51	0.09
LHS	30	HYSO-4	478606	10.99	0.33	0.06
LHS	57	HYSO-4	413808	9.50	0.28	0.05
LHS	16	HYSO-4	96494	2.22	0.07	0.01
LHS	44	HYSO-4	80384	1.85	0.06	0.01
LHS	25	HYSO-4	242544	5.57	0.17	0.03
LHS	2	HYSO-4	870726	19.99	0.60	0.10
LHS	11	HYSO-4	84848	1.95	0.06	0.01
LHS	41	HYSO-4	219250	5.03	0.15	0.03
LHS	23	HYSO-4	180306	4.14	0.12	0.02
LHS	19	HYSO-4	138291	3.17	0.09	0.02
LHS	12	HYSO-4	84162	1.93	0.06	0.01
LHS	42	HYSO-4	211601	4.86	0.15	0.03
LHS	TOT	HYSO-4	10892689	250.06	7.48	1.29

WC - Watershed Code WN - Wetland Number WT - Wetland Type

POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
LHS	29	HYSO-5	216581	4.97	0.15	0.03
LHS	51	HYSO-5	57133	1.31	0.04	0.01
LHS	52	HYSO-5	258073	5.92	0.18	0.03
LHS	35	HYSO-5	323710	7.43	0.22	0.04
LHS	53	HYSO-5	425893	9.78	0.29	0.05
LHS	47	HYSO-5	317792	7.30	0.22	0.04
LHS	54	HYSO-5	142182	3.26	0.10	0.02
LHS	34	HYSO-5	2063338	47.37	1.42	0.24
LHS	27	HYSO-5	14319	0.33	0.01	0.00
LHS	39	HYSO-5	677633	15.56	0.47	0.08
LHS	14	HYSO-5	20391	0.47	0.01	0.00
LHS	48	HYSO-5	2450940	56.27	1.68	0.29
LHS	46	HYSO-5	889696	20.42	0.61	0.11
LHS	32	HYSO-5	46323	1.06	0.03	0.01
LHS	3	HYSO-5	28151	0.65	0.02	0.00
LHS TOT		HYSO-5	7932155	182.10	5.45	0.94
LHS TOT		TOTAL			18.19	3.15
LHW	42	E1OWLx	79879	1.83	0.05	0.01
LHW TOT		E1OWLx	79879	1.83	0.05	0.01
LHW	68	E1UB4L6	34429	0.79	0.02	0.00
LHW	67	E1UB4L6	48746	1.12	0.03	0.01
LHW TOT		E1UB4L6	83175	1.91	0.06	0.01

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POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
LHW	30	E2EM5P6	256888	5.90	0.18	0.03
LHW	23	E2EM5P6	191730	4.40	0.13	0.02
LHW	41	E2EM5P6	991030	22.75	0.68	0.12
LHW	18	E2EM5P6	165690	3.80	0.11	0.02
LHW	65	E2EM5P6	173063	3.97	0.12	0.02
LHW	40	E2EM5P6	198271	4.55	0.14	0.02
LHW	20	E2EM5P6	421823	9.68	0.29	0.05
LHW	38	E2EM5P6	1205220	27.67	0.83	0.14
LHW	49	E2EM5P6	259384	5.95	0.18	0.03
LHW	37	E2EM5P6	93933	2.16	0.06	0.01
LHW	22	E2EM5P6	146908	3.37	0.10	0.02
LHW	13	E2EM5P6	217548	4.99	0.15	0.03
LHW	58	E2EM5P6	114024	2.62	0.08	0.01
LHW	46	E2EM5P6	2238426	51.39	1.54	0.27
LHW	60	E2EM5P6	93691	2.15	0.06	0.01
LHW	50	E2EM5P6	506986	11.64	0.35	0.06
LHW	25	E2EM5P6	68716	1.58	0.05	0.01
LHW	39	E2EM5P6	552277	12.68	0.38	0.07
LHW	26	E2EM5P6	177740	4.08	0.12	0.02
LHW	64	E2EM5P6	159411	3.66	0.11	0.02
LHW	66	E2EM5P6	428114	9.83	0.29	0.05
LHW	4	E2EM5P6	1985510	45.58	1.36	0.24
LHW	28	E2EM5P6	211646	4.86	0.15	0.03
LHW	10	E2EM5P6	408110	9.37	0.28	0.05
LHW	59	E2EM5P6	31205	0.72	0.02	0.00
LHW	61	E2EM5P6	100162	2.30	0.07	0.01
LHW	62	E2EM5P6	14549	0.33	0.01	0.00
LHW TOT	E2EM5P6		11412057	261.98	7.84	1.35
LHW	24	PFO1A	276961	6.36	0.19	0.03
LHW	35	PFO1A	63753	1.46	0.04	0.01
LHW	56	PFO1A	80471	1.85	0.06	0.01
LHW	7	PFO1A	722654	16.59	0.50	0.09
LHW	15	PFO1A	1020089	23.42	0.70	0.12
LHW	8	PFO1A	113817	2.61	0.08	0.01
LHW	55	PFO1A	88678	2.04	0.06	0.01
LHW	11	PFO1A	343104	7.88	0.24	0.04
LHW TOT	PFO1A		2709527	62.20	1.86	0.32
LHW	19	PFO1C	60554	1.39	0.04	0.01
LHW	16	PFO1C	405259	9.30	0.28	0.05
LHW TOT	PFO1C		465814	10.69	0.32	0.06

WC - Watershed Code WN - Wetland Number WT - Wetland Type

POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
LHW	1	PFO1E	125988	2.89	0.09	0.01
LHW	TOT	PFO1E	125988	2.89	0.09	0.01
LHW	32	PFO1R	32109	0.74	0.02	0.00
LHW	33	PFO1R	17432	0.40	0.01	0.00
LHW	21	PFO1R	200540	4.60	0.14	0.02
LHW	17	PFO1R	153413	3.52	0.11	0.02
LHW	36	PFO1R	46958	1.08	0.03	0.01
LHW	5	PFO1R	53956	1.24	0.04	0.01
LHW	9	PFO1R	201266	4.62	0.14	0.02
LHW	2	PFO1R	1167718	26.81	0.80	0.14
LHW	TOT	PFO1R	1873393	43.01	1.29	0.22
LHW	29	PFO1S	70754	1.62	0.05	0.01
LHW	TOT	PFO1S	70754	1.62	0.05	0.01
LHW	47	POWFh	48822	1.12	0.03	0.01
LHW	53	POWFh	8034	0.18	0.01	0.00
LHW	TOT	POWFh	56856	1.31	0.04	0.01
LHW	52	POWFx	15151	0.35	0.01	0.00
LHW	TOT	POWFx	15151	0.35	0.01	0.00
LHW	6	POWZb	3199	0.07	0.00	0.00
LHW	TOT	POWZb	3199	0.07	0.00	0.00
LHW	51	POWZh	217151	4.99	0.15	0.03
LHW	34	POWZh	36299	0.83	0.02	0.00
LHW	63	POWZh	117038	2.69	0.08	0.01
LHW	14	POWZh	4898	0.11	0.00	0.00
LHW	43	POWZh	63912	1.47	0.04	0.01
LHW	TOT	POWZh	439298	10.08	0.30	0.05
LHW	31	POWZx	40965	0.94	0.03	0.00
LHW	57	POWZx	11233	0.26	0.01	0.00
LHW	54	POWZx	10483	0.24	0.01	0.00
LHW	TOT	POWZx	62681	1.44	0.04	0.01

WC - Watershed Code WN - Wetland Number WT - Wetland Type

POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
LHW	27	PSS1R	19837	0.46	0.01	0.00
LHW	3	PSS1R	66031	1.52	0.05	0.01
LHW	45	PSS1R	127842	2.93	0.09	0.02
LHW	48	PSS1R	118458	2.72	0.08	0.01
LHW	44	PSS1R	63147	1.45	0.04	0.01
LHW	12	PSS1R	14740	0.34	0.01	0.00
LHW TOT		PSS1R	410056	9.41	0.28	0.05
LHW TOT		TOTAL			12.23	2.11
LLS	3	HYSO-3	3392187	77.87	5.38	0.40
LLS	9	HYSO-3	121527	2.79	0.19	0.01
LLS	7	HYSO-3	503471	11.56	0.80	0.06
LLS TOT		HYSO-3	4017185	92.22	6.37	0.48
LLS	11	HYSO-4	2237783	51.37	3.55	0.27
LLS	14	HYSO-4	48671	1.12	0.08	0.01
LLS	15	HYSO-4	403547	9.26	0.64	0.05
LLS	12	HYSO-4	319236	7.33	0.51	0.04
LLS	13	HYSO-4	68112	1.56	0.11	0.01
LLS TOT		HYSO-4	3077349	70.65	4.88	0.37
LLS	10	HYSO-5	1406718	32.29	2.23	0.17
LLS	2	HYSO-5	32744	0.75	0.05	0.00
LLS	1	HYSO-5	112341	2.58	0.18	0.01
LLS	6	HYSO-5	173914	3.99	0.28	0.02
LLS	4	HYSO-5	286067	6.57	0.45	0.03
LLS	16	HYSO-5	52802	1.21	0.08	0.01
LLS	8	HYSO-5	265145	6.09	0.42	0.03
LLS	5	HYSO-5	811383	18.63	1.29	0.10
LLS TOT		HYSO-5	3141113	72.11	4.98	0.37
LLS TOT		TOTAL			16.24	1.22
LLW	22	E2EM5P6	16513	0.38	0.03	0.00
LLW	19	E2EM5P6	304337	6.99	0.48	0.04
LLW	18	E2EM5P6	2077328	47.69	3.29	0.25
LLW	21	E2EM5P6	69220	1.59	0.11	0.01
LLW	20	E2EM5P6	420492	9.65	0.67	0.05
LLW TOT		E2EM5P6	2887889	66.30	4.58	0.34

WC - Watershed Code WN - Wetland Number WT - Wetland Type

POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
LLW	11	PFO1A	199580	4.58	0.32	0.02
LLW	3	PFO1A	2003818	46.00	3.18	0.24
LLW	TOT	PFO1A	2203398	50.58	3.49	0.26
LLW	6	PFO1C	501964	11.52	0.80	0.06
LLW	10	PFO1C	50819	1.17	0.08	0.01
LLW	TOT	PFO1C	552784	12.26	0.88	0.07
LLW	7	PFO1R	153243	3.52	0.24	0.02
LLW	17	PFO1R	58632	1.35	0.09	0.01
LLW	13	PFO1R	361826	8.31	0.57	0.04
LLW	15	PFO1R	19014	0.44	0.03	0.00
LLW	TOT	PFO1R	592714	13.61	0.94	0.07
LLW	4	POWZh	56445	1.30	0.09	0.01
LLW	8	POWZh	21530	0.49	0.03	0.00
LLW	5	POWZh	34240	0.79	0.05	0.00
LLW	12	POWZh	43192	0.99	0.07	0.01
LLW	2	POWZh	101873	2.34	0.16	0.01
LLW	9	POWZh	21210	0.49	0.03	0.00
LLW	1	POWZh	22836	0.52	0.04	0.00
LLW	14	POWZh	18586	0.43	0.03	0.00
LLW	TOT	POWZh	319911	7.34	0.51	0.04
LLW	16	PSS1R	56366	1.29	0.09	0.01
LLW	TOT	PSS1R	56366	1.29	0.09	0.01
LLW	TOT	TOTAL			10.49	0.79
MCS	4.4	HYSO-3	9634	0.22	0.01	0.00
MCS	5.2	HYSO-3	530192	12.17	0.41	0.06
MCS	4.1	HYSO-3	165716	3.80	0.13	0.02
MCS	10	HYSO-3	130620	3.00	0.10	0.02
MCS	4.3	HYSO-3	33364	0.77	0.03	0.00
MCS	5.1	HYSO-3	8446349	193.90	6.46	1.00
MCS	4.2	HYSO-3	17803	0.41	0.01	0.00
MCS	TOT	HYSO-3	9333679	214.27	7.14	1.11
MCS	15	HYSO-4	47439	1.09	0.04	0.01
MCS	13	HYSO-4	1063079	24.40	0.81	0.13
MCS	14	HYSO-4	866873	19.90	0.66	0.10
MCS	16	HYSO-4	22230	0.51	0.02	0.00
MCS	TOT	HYSO-4	1999622	45.90	1.53	0.24

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POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
MCS	1.2	HYSO-5	52817	1.21	0.04	0.01
MCS	12	HYSO-5	26252	0.60	0.02	0.00
MCS	3	HYSO-5	58936	1.35	0.05	0.01
MCS	8	HYSO-5	156720	3.60	0.12	0.02
MCS	2	HYSO-5	1254240	28.79	0.96	0.15
MCS	6	HYSO-5	2649461	60.82	2.03	0.31
MCS	1.1	HYSO-5	57980	1.33	0.04	0.01
MCS	7	HYSO-5	30842	0.71	0.02	0.00
MCS	11	HYSO-5	42364	0.97	0.03	0.01
MCS	9	HYSO-5	187022	4.29	0.14	0.02
MCS TOT		HYSO-5	4516633	103.69	3.45	0.54
MCS TOT TOTAL					12.12	1.88
MCW	20	E2EM5P6	807582	18.54	0.62	0.10
MCW	22	E2EM5P6	83019	1.91	0.06	0.01
MCW	19	E2EM5P6	792281	18.19	0.61	0.09
MCW TOT		E2EM5P6	1682882	38.63	1.29	0.20
MCW	7	PEM5A	73908	1.70	0.06	0.01
MCW TOT		PEM5A	73908	1.70	0.06	0.01
MCW	4	PEM5C	97764	2.24	0.07	0.01
MCW TOT		PEM5C	97764	2.24	0.07	0.01
MCW	9	PFO1A	1688307	38.76	1.29	0.20
MCW	16	PFO1A	191063	4.39	0.15	0.02
MCW	6	PFO1A	545077	12.51	0.42	0.06
MCW	10.2	PFO1A	90937	2.09	0.07	0.01
MCW	12	PFO1A	210871	4.84	0.16	0.03
MCW	3	PFO1A	1342741	30.83	1.03	0.16
MCW	5	PFO1A	40683	0.93	0.03	0.00
MCW	11	PFO1A	156071	3.58	0.12	0.02
MCW TOT		PFO1A	4265751	97.93	3.26	0.51
MCW	10.1	PFO1C	380122	8.73	0.29	0.05
MCW TOT		PFO1C	380122	8.73	0.29	0.05
MCW	18	PFO1R	386891	8.88	0.30	0.05
MCW	13	PFO1R	380500	8.74	0.29	0.05
MCW TOT		PFO1R	767391	17.62	0.59	0.09

WC - Watershed Code WN - Wetland Number WT - Wetland Type

POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
MCW	15	PFO1S	116867	2.68	0.09	0.01
MCW	TOT	PFO1S	116867	2.68	0.09	0.01
MCW	21	POWZh	38884	0.89	0.03	0.00
MCW	2	POWZh	11287	0.26	0.01	0.00
MCW	1	POWZh	35985	0.83	0.03	0.00
MCW	8	POWZh	58834	1.35	0.04	0.01
MCW	17	POWZh	170566	3.92	0.13	0.02
MCW	TOT	POWZh	315555	7.24	0.24	0.04
MCW	14	P(SS1/EM5)R	470908	10.81	0.36	0.06
MCW	TOT	P(SS1/EM5)R	470908	10.81	0.36	0.06
MCW	TOT	TOTAL			6.25	0.97
RBS	3	HYSO-3	2505354	57.52	4.90	0.30
RBS	4	HYSO-3	2199137	50.49	4.30	0.26
RBS	TOT	HYSO-3	4704491	108.00	9.21	0.56
RBS	5	HYSO-5	10719	0.25	0.02	0.00
RBS	1	HYSO-5	31915	0.73	0.06	0.00
RBS	2	HYSO-5	115787	2.66	0.23	0.01
RBS	TOT	HYSO-5	158421	3.64	0.31	0.02
RBS	TOT	TOTAL			9.52	0.58
RBW	4	PEM5A	89012	2.04	0.17	0.01
RBW	TOT	PEM5A	89012	2.04	0.17	0.01
RBW	6	PFO1A	1611691	37.00	3.15	0.19
RBW	2	PFO1A	818341	18.79	1.60	0.10
RBW	TOT	PFO1A	2430032	55.79	4.76	0.29
RBW	7	PFO1C	206903	4.75	0.41	0.02
RBW	TOT	PFO1C	206903	4.75	0.41	0.02
RBW	9	PFO1R	258485	5.93	0.51	0.03
RBW	TOT	PFO1R	258485	5.93	0.51	0.03
RBW	5	POWfb	21135	0.49	0.04	0.00
RBW	TOT	POWfb	21135	0.49	0.04	0.00

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POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
RBW	8	POWZ	17675	0.41	0.03	0.00
RBW TOT	POWZ		17675	0.41	0.03	0.00
RBW	3	POWZh	30457	0.70	0.06	0.00
RBW	1	POWZh	13768	0.32	0.03	0.00
RBW TOT	POWZh		44225	1.02	0.09	0.01
RBW TOT	TOTAL				6.00	0.36
SBS	12	HYSO-3	7875797	180.80	4.17	0.93
SBS	13	HYSO-3	19642	0.45	0.01	0.00
SBS	11	HYSO-3	12231002	280.79	6.47	1.45
SBS TOT	HYSO-3		20126441	462.04	10.65	2.39
SBS	4.1	HYSO-5	255142	5.86	0.13	0.03
SBS	10	HYSO-5	41406	0.95	0.02	0.00
SBS	3	HYSO-5	180121	4.14	0.10	0.02
SBS	2	HYSO-5	36505	0.84	0.02	0.00
SBS	5	HYSO-5	176574	4.05	0.09	0.02
SBS	1	HYSO-5	24432	0.56	0.01	0.00
SBS	7	HYSO-5	101065	2.32	0.05	0.01
SBS	8	HYSO-5	244450	5.61	0.13	0.03
SBS	9	HYSO-5	175067	4.02	0.09	0.02
SBS	4.2	HYSO-5	82266	1.89	0.04	0.01
SBS	14.2	HYSO-5	9669	0.22	0.01	0.00
SBS	6	HYSO-5	410979	9.43	0.22	0.05
SBS	14.1	HYSO-5	69673	1.60	0.04	0.01
SBS TOT	HYSO-5		1807350	41.49	0.96	0.21
SBS TOT	TOTAL				11.60	2.60
SBW	13	PFO1A	1327419	30.47	0.70	0.16
SBW	25	PFO1A	418914	9.62	0.22	0.05
SBW	5	PFO1A	1066833	24.49	0.56	0.13
SBW	2	PFO1A	252863	5.80	0.13	0.03
SBW	9	PFO1A	325904	7.48	0.17	0.04
SBW	27	PFO1A	329403	7.56	0.17	0.04
SBW	19	PFO1A	3574142	82.05	1.89	0.42
SBW TOT	PFO1A		7295476	167.48	3.86	0.87

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POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
SBW	20	PFO1C	67553	1.55	0.04	0.01
SBW	24	PFO1C	249172	5.72	0.13	0.03
SBW	18	PFO1C	252495	5.80	0.13	0.03
SBW	21	PFO1C	203522	4.67	0.11	0.02
SBW TOT		PFO1C	772742	17.74	0.41	0.09
SBW	26	PFO1Eb	494016	11.34	0.26	0.06
SBW	29	PFO1Eb	479571	11.01	0.25	0.06
SBW	10	PFO1Eb	215351	4.94	0.11	0.03
SBW	14	PFO1Eb	78456	1.80	0.04	0.01
SBW TOT		PFO1Eb	1267394	29.10	0.67	0.15
SBW	28	POWZh	252865	5.80	0.13	0.03
SBW	11	POWZh	44916	1.03	0.02	0.01
SBW	22	POWZh	42151	0.97	0.02	0.01
SBW	17	POWZh	28264	0.65	0.01	0.00
SBW	23	POWZh	40130	0.92	0.02	0.00
SBW	12	POWZh	20105	0.46	0.01	0.00
SBW	3	POWZh	18132	0.42	0.01	0.00
SBW	16	POWZh	61484	1.41	0.03	0.01
SBW	1	POWZh	47517	1.09	0.03	0.01
SBW	15	POWZh	47858	1.10	0.03	0.01
SBW	4	POWZh	235168	5.40	0.12	0.03
SBW TOT		POWZh	838590	19.25	0.44	0.10
SBW	8	P(FO5/OW)Fb	206365	4.74	0.11	0.02
SBW	6	P(FO5/OW)Fb	115561	2.65	0.06	0.01
SBW TOT		P(FO5/OW)Fb	321926	7.39	0.17	0.04
SBW	7	P(FO/EM)5Fb	137651	3.16	0.07	0.02
SBW TOT		P(FO/EM)5Fb	137651	3.16	0.07	0.02
SBW TOT		TOTAL			5.63	1.26
T1S	1	HYSO-3	8370544	192.16	8.48	0.99
T1S TOT		TOTAL	8370544	192.16	8.48	0.99
T1W	18	PEM5Eb	518652	11.91	0.53	0.06
T1W TOT		PEM5Eb	518652	11.91	0.53	0.06

WC - Watershed Code WN - Wetland Number WT - Wetland Type

POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
T1W	12	PEM5Fb	167622	3.85	0.17	0.02
T1W TOT		PEM5Fb	167622	3.85	0.17	0.02
T1W	4	PFO1A	638848	14.67	0.65	0.08
T1W TOT		PFO1A	638848	14.67	0.65	0.08
T1W	20	PFO1C	821133	18.85	0.83	0.10
T1W TOT		PFO1C	821133	18.85	0.83	0.10
T1W	11	PFO1E	150585	3.46	0.15	0.02
T1W TOT		PFO1E	150585	3.46	0.15	0.02
T1W	10	POWFb	46052	1.06	0.05	0.01
T1W TOT		POWFb	46052	1.06	0.05	0.01
T1W	19	POWFh	19328	0.44	0.02	0.00
T1W TOT		POWFh	19328	0.44	0.02	0.00
T1W	15	POWZh	42834	0.98	0.04	0.01
T1W	17	POWZh	18164	0.42	0.02	0.00
T1W	2	POWZh	54539	1.25	0.06	0.01
T1W	9	POWZh	13310	0.31	0.01	0.00
T1W	1	POWZh	33452	0.77	0.03	0.00
T1W	3	POWZh	15264	0.35	0.02	0.00
T1W	7	POWZh	44709	1.03	0.05	0.01
T1W	8	POWZh	21261	0.49	0.02	0.00
T1W	13	POWZh	19556	0.45	0.02	0.00
T1W	16	POWZh	5682	0.13	0.01	0.00
T1W TOT		POWZh	268770	6.17	0.27	0.03
T1W	6	P(FO1/EM5)C	813389	18.67	0.82	0.10
T1W TOT		P(FO1/EM5)C	813389	18.67	0.82	0.10
T1W	14	P(FO1/EM5)Eb	978043	22.45	0.99	0.12
T1W TOT		P(FO1/EM5)Eb	978043	22.45	0.99	0.12
T1W	5	P(FO5/OW)Fb	23475	0.54	0.02	0.00
T1W	21	P(FO5/OW)Fb	76687	1.76	0.08	0.01
T1W TOT		P(FO5/OW)Fb	100162	2.30	0.10	0.01
T1W TOT		TOTAL			4.58	0.54

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POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
UHS	9	HYSO-3	68877	1.58	0.04	0.01
UHS	5	HYSO-3	17885674	410.60	10.90	2.12
UHS	8	HYSO-3	130907	3.01	0.08	0.02
UHS	7	HYSO-3	171647	3.94	0.10	0.02
UHS TOT		HYSO-3	18257105	419.13	11.13	2.17
UHS	6	HYSO-5	54336	1.25	0.03	0.01
UHS	1	HYSO-5	65070	1.49	0.04	0.01
UHS	4	HYSO-5	44342	1.02	0.03	0.01
UHS	3	HYSO-5	32814	0.75	0.02	0.00
UHS	2	HYSO-5	146405	3.36	0.09	0.02
UHS TOT		HYSO-5	342968	7.87	0.21	0.04
UHS TOT		TOTAL			11.34	2.21
UHW	17	PEM5Eb	193901	4.45	0.12	0.02
UHW	25	PEM5Eb	258245	5.93	0.16	0.03
UHW TOT		PEM5Eb	452146	10.38	0.28	0.05
UHW	6	PFO1A	456125	10.47	0.28	0.05
UHW	19	PFO1A	1173802	26.95	0.72	0.14
UHW	22	PFO1A	839481	19.27	0.51	0.10
UHW	8	PFO1A	608976	13.98	0.37	0.07
UHW TOT		PFO1A	3078385	70.67	1.88	0.37
UHW	13	PFO1C	801656	18.40	0.49	0.10
UHW TOT		PFO1C	801656	18.40	0.49	0.10
UHW	29	PFO1E	125597	2.88	0.08	0.01
UHW	27	PFO1E	427614	9.82	0.26	0.05
UHW TOT		PFO1E	553211	12.70	0.34	0.07
UHW	10	PFO1Eb	551626	12.66	0.34	0.07
UHW	23	PFO1Eb	65169	1.50	0.04	0.01
UHW	16	PFO1Eb	369796	8.49	0.23	0.04
UHW	24	PFO1Eb	1189850	27.32	0.73	0.14
UHW	20	PFO1Eb	161954	3.72	0.10	0.02
UHW TOT		PFO1Eb	2338395	53.68	1.43	0.28
UHW	18	POWFb	32285	0.74	0.02	0.00
UHW TOT		POWFb	32285	0.74	0.02	0.00

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POTENTIAL WETLAND AREAS
Hunting Creek Watershed

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WC	WN	WT	Area sq. ft.	Area Acres	Percent Sub- Watershed	Percent Total Watershed
UHW	1	POWFh	63333	1.45	0.04	0.01
UHW	TOT	POWFh	63333	1.45	0.04	0.01
UHW	3	POWZh	46494	1.07	0.03	0.01
UHW	7	POWZh	62279	1.43	0.04	0.01
UHW	2	POWZh	35567	0.82	0.02	0.00
UHW	28	POWZh	27176	0.62	0.02	0.00
UHW	15	POWZh	43665	1.00	0.03	0.01
UHW	4	POWZh	136233	3.13	0.08	0.02
UHW	TOT	POWZh	351415	8.07	0.21	0.04
UHW	5	PSS1A	107478	2.47	0.07	0.01
UHW	21	PSS1A	702639	16.13	0.43	0.08
UHW	TOT	PSS1A	810117	18.60	0.49	0.10
UHW	26	P(FO5/OW)Fb	167269	3.84	0.10	0.02
UHW	11	P(FO5/OW)Fb	82024	1.88	0.05	0.01
UHW	9	P(FO5/OW)Fb	106021	2.43	0.06	0.01
UHW	14	P(FO5/OW)Fb	86463	1.98	0.05	0.01
UHW	12	P(FO5/OW)Fb	73844	1.70	0.05	0.01
UHW	TOT	P(FO5/OW)Fb	515621	11.84	0.31	0.06
UHW	TOT	TOTAL			5.48	1.07

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APPENDIX B

McCARTHY & ASSOCIATES, INC.

REGULATORY and ENVIRONMENTAL
CONSULTANTS

Preliminary Wetland Assessment

**For Portions of the Hunting Creek
Watershed
Prince Frederick Town Center
Calvert County, Maryland**

**Prepared By:
McCarthy and Associates, Inc.**

October, 1991

14458 Old Mill Road #201
Upper Marlboro, MD 20772

(301) 627-7505

PURPOSE AND INTRODUCTION

The purpose of the Hunting Creek Watershed wetland assessment is to provide Calvert County planners with a rough approximation of the extent and location of jurisdiction of tidal wetlands, on various properties, within the town center. This assessment is not intended to replace actual field delineation and surveyed locations. An actual delineation would require the field implementation of the 1987 Corps Manual. This methodology requires that three parameters be satisfied in order for an area to be classified as a jurisdictional wetland. The three parameters include the presence of wetland hydrology, hydric soils, and a dominance, 50% or greater, coverage of hydrophytic vegetation. In making this approximation, the three parameter system was applied in a general form to the various more questionable areas at a number of locations along stream margins and swale bottoms. Soils were sampled and compared to the Munsell Color Chart. Munsell colors of two chroma or 1 chroma with mottles are considered hydric. Vegetation was identified and placed into either tree, sapling/shrubs, herbaceous, and woody vine categories. The three most dominant species in each category have been recorded on the enclosed data sheets with their appropriate indicator status. Obvious signs of hydrology were noted, as well. If all three parameters are deemed to be present, then the area in question would be considered wetland. Contiguous wetland areas have been drawn, to the best of the field evaluator's ability, on a topographic map corresponding to the portions of land being evaluated. The properties evaluated were:

Property Owner

County Comm. of Calvert County, P. 549
Board of Education, P. 4
John William, Jr., P. 566 and P. 5
County Comm. of Calvert County, P. 511 and
Section "A" and "B"
Gott Realty C., Inc., P. 15
Calvert Village LTD Partnership, P. 236
Calvert Association for Retarded Citizens, P. 66

A copy of the tax map corresponding to the properties is included in Appendix B, along with access consent forms for properties not owned by Calvert County.

Calvert County Tax Map Number 24, indicating the properties evaluated, was overlain on a corresponding topographic map. Property lines are approximation based on limited information and will likely vary in reality. For the purposes of the study the lines should be sufficient. The maps were taken into the field and used to locate position and show point corresponding to data sheets. Maps and data sheets are enclosed in Appendix A.

The data sheets document the finding at each location and reasons for the determination made. Vegetation is broken into four categories: Trees, sapling/shrub, herbaceous, and woody vines. Within these categories the three most dominant species are listed by scientific name. Besides each of the species identified, the indicator status is listed. The indicator status is listed in Reed, P.B., Jr. 1988. National List of Plant Species That Occur In Wetlands: Northeast (Region 1). U.S. Fish and Wildlife Service Biol. Rep. 88 (26.1). 111 pp. This publication cites species tolerance to anaerobic soil conditions found in wetlands. The classification hierarchy is designed to predict the chance of finding a particular species in a wetland. Indicator categories cited in the plant list are:

Indicator Categories

Obligate Wetland (OBL). Occur most always (estimated probability >99%) under natural conditions in wetlands.

Facultative Wetland (FACW). Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non wetlands.

Facultative (FAC). Equally likely to occur in wetlands or non wetlands (estimated probability 34%-66%).

Facultative Upland (FACU). Usually occur in non wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%).

Obligate Upland (UPL). Occur in wetlands in another region, but occur almost always (estimated probability > 99%) under natural conditions in non wetlands in the region specified. If a species does not occur in wetlands in any region, it is not listed on the National List.

Under the 1987 Corps Manual (FAC-) or dryer indicators are not considered to be typically adapted to anaerobic soil conditions. Areas need to have 50% or greater dominance of FAC, FACW, and/or OBL species to be considered wetland.

Soil evaluations were made using a 2 1/2 inch bucket auger and extracting a sample to 12 inches in depth. The soils were evaluated for color and mottling, as well as other indicators of saturation. Color determinations were made by comparison to the Munsell Color Chart and findings were recorded on the data sheets. A copy of the county soil map has been included in Appendix A.

The maps show the overall rough determinations based on the data gathered in the field. Red areas indicate jurisdictional wetlands and waters of the United States. Yellow areas depict more questionable wetland calls. These areas would knowingly require more field time and a jurisdictional determination by the appropriate agencies.

CONCLUSIONS

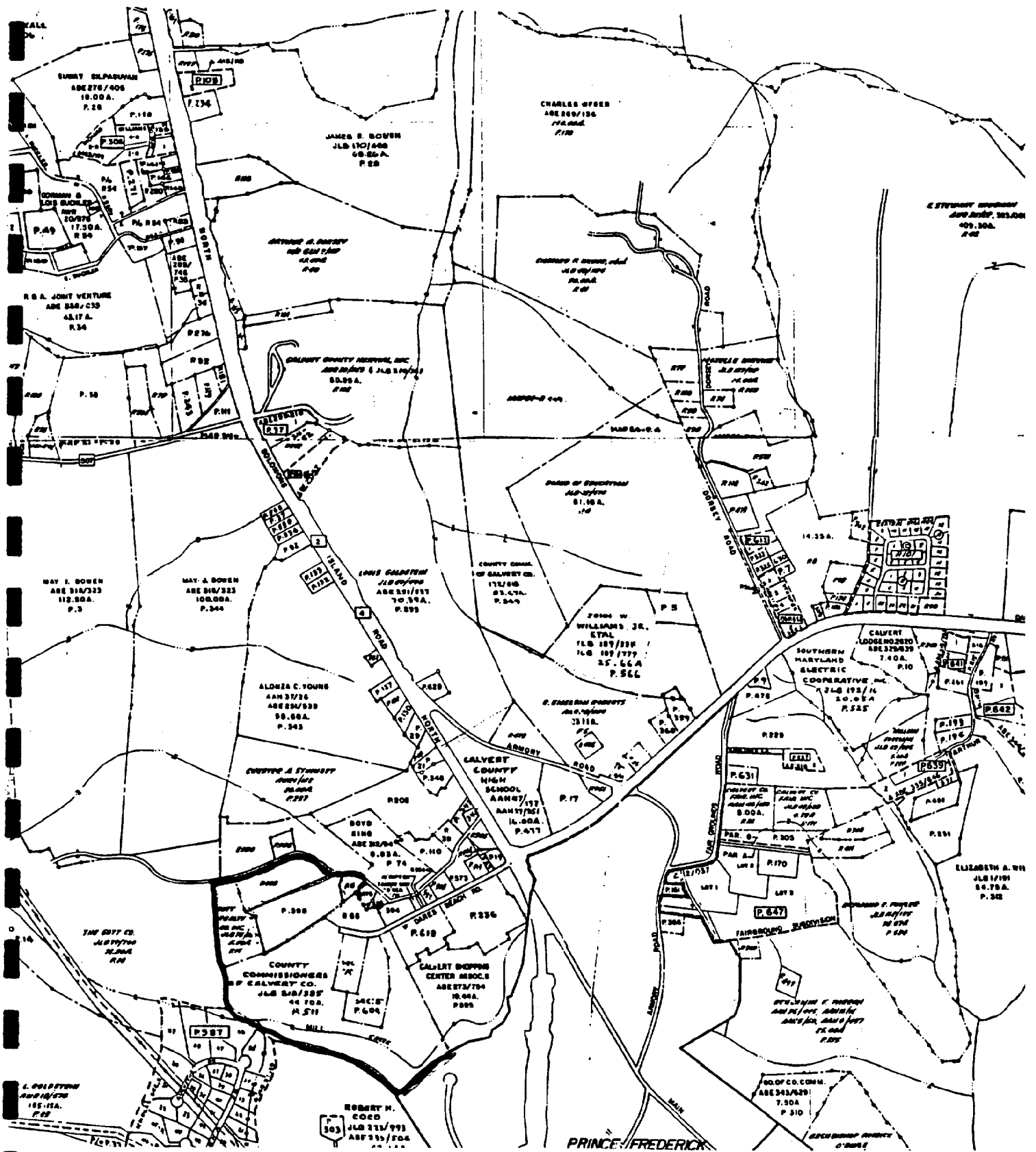
For the most part, the data sheets and maps conclude the findings as they were found in the field. It should be noted that during an actual delineation a more comprehensive vegetative analysis would be done, and a greater number of soil samples are taken when defining the wetland/upland boundary. This analysis was an overview and much less time was spent at each location.

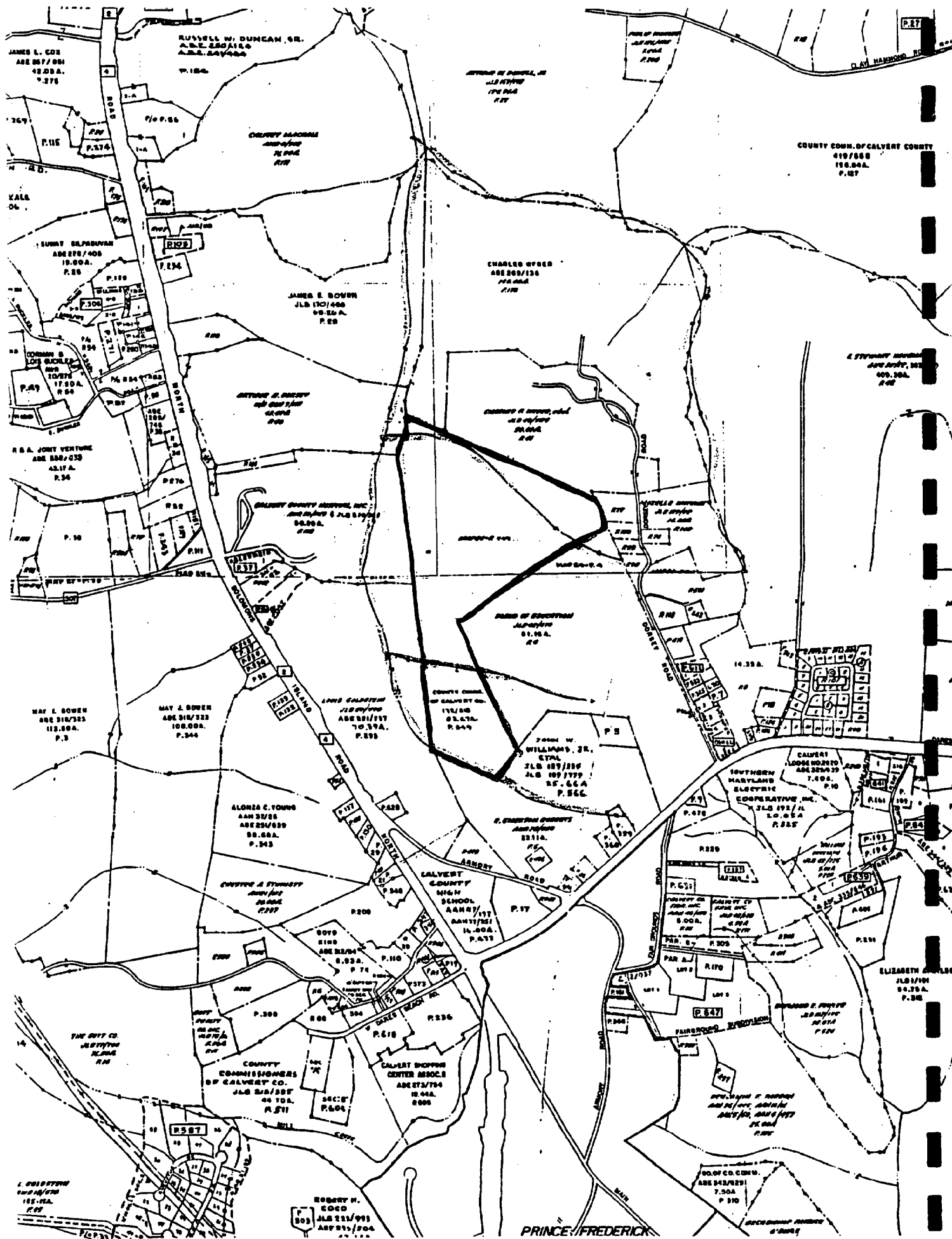
The question was raised, prior to the evaluation, as to the changes in the manuals used to identify and delineate non-tidal wetlands. The 1989 Federal Manual is no longer being used by the Army Corps of Engineers. In its place, the 1987 Corps Manual is now being implemented. A 1991 manual is being reviewed, though its future implementation is unknown at this time. It was determined that in order to make a general determination on the site, the differences between manuals was not a major issue. The evaluation, though, was directed by the 1987 Corps Manual methodology as there needed to be a set of criterion for making a determination. The inherent inaccuracies of a hand drawn line is overriding differences between manuals in most places.

References: National List of Plant Species That Occur In Wetlands: Northeast (Region 1), U.S. Fish and Wildlife Service Biological Report, May 1988



APPENDIX A





DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: Parcel 549
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: Sep. 17, 1991 Plot No.: 1 Section: _____

Vegetation (list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)). Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. Liquidambar styraciflua (FAC)		7. Lycopodium complanatum (FACu-)	
2. Acer rubrum (FAC)		8. Polystichum acrostichoides (FACu-)	
3. Liriodendron tulipifera (FACu)		9. _____	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. Viburnum acerifolium (UPL)		10. Mitchella repens (FACu)	
5. Eonymus americanus (FAC)		11. Vitis labrusca (FACu)	
6. Ilex opaca (FACu)		12. Parthenocissus quinquefolia (FACu)	
<p>% of species that are OBL, FACW, and/or FAC: <u>20%</u> Other indicators: _____</p> <p>Hydrophytic vegetation: Yes _____ No <u>X</u> Basis: <u>Not dominant</u></p>			

Soil

Series and phase: Sc E On hydric soils list? Yes _____; No X.
Mottled: Yes _____; No X. Mottle color: _____; Matrix color: 10YR 4/4
Gleyed: Yes _____ No X Other indicators: _____
Hydric soils: Yes _____ No X; Basis: chrome > 2

Hydrology

Inundated: Yes _____; No X. Depth of standing water: not found.
Saturated soils: Yes _____; No X. Depth to saturated soil: not found.
Other indicators: none
Wetland hydrology: Yes _____; No X. Basis: No field indicators.
Atypical situation: Yes _____; No X.
Normal Circumstances? Yes X No _____.
Wetland Determination: Wetland _____; Nonwetland X.

Comments:

Determined by: Ken M. East

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: Parcel 541
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: Sep. 17, 1991 Plot No.: 2 Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <i>Platanus occidentalis</i> (FACW)		7. <i>Pilea fontana</i> (FACW)	
2. <i>Fagus grandifolia</i> (FACW)		8. <i>Cinna arundinacea</i> (FACW)	
3. <i>Liquidambar styraciflua</i> (FAC)		9. <i>Impatiens capensis</i> (FACW)	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Lindera benzoin</i> (FACW)		10. <i>Smilax rotundifolia</i>	
5. <i>Carpinus caroliniana</i> (FAC)		11. <i>Toxicodendron radicans</i> (FAC)	
6. <i>Vaccinium corymbosum</i> (FACW)		12.	

% of species that are OBL, FACW, and/or FAC: 90% Other indicators: channel.
Hydrophytic vegetation: Yes X No ____ Basis: balance

Soil

Series and phase: My On hydric soils list? Yes X; No ____.
Mottled: Yes X; No ____ Mottle color: 10YR 4/6; Matrix color: 5Y 6/1.
Gleyed: Yes X No ____ Other indicators: oxidized rhizospheres
Hydric soils: Yes X No ____; Basis: field determination

Hydrology

Inundated: Yes X; No ____ Depth of standing water: Not found.
Saturated soils: Yes X; No ____ Depth to saturated soil: 10".
Other indicators: Alluvial deposits, drift lines, seepage.
Wetland hydrology: Yes X; No ____ Basis: observable wetland hydrology.
Atypical situation: Yes ____; No X.
Normal Circumstances? Yes X No ____.
Wetland Determination: Wetland X; Nonwetland ____.

Comments:

Determined by: _____

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: Parcel 549
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: Sept. 17, 1991 Plot No.: 2a Section: _____

Vegetation (list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)). Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. Liquidambar styraciflua (FAC)		7. Chimaphila maculata (uph)	
2. Platanus occidentalis (FACW)		8. Polystichum acrostichoides (FACW)	
3. Fagus grandifolia (FACW)		9. _____	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. Cornus Florida (FACW)		10. _____	
5. Asimina triloba (FACW+)		11. _____	
6. Lindera benzoin (FACW-)		12. _____	

% of species that are OHL, FACW, and/or FAC: 45% Other indicators: _____
Hydrophytic vegetation: Yes _____ No X. Basis: This is an area of potential regulatory argument and should be reviewed

Soil

Series and phase: SrE On hydric soils list? Yes _____; No X.
Mottled: Yes _____; No X. Mottle color: _____; Matrix color: 10YR 4/4.
Gleyed: Yes _____ No X Other indicators: None.
Hydric soils: Yes _____ No X; Basis: chroma > 2

Hydrology

Inundated: Yes _____; No X. Depth of standing water: none found.
Saturated soils: Yes _____; No X. Depth to saturated soil: _____.
Other indicators: Same areas show signs of water movement.
Wetland hydrology: Yes _____; No X. Basis: _____.
Atypical situation: Yes _____; No X.
Normal Circumstances? Yes X No _____.
Wetland Determination: Wetland _____; Nonwetland X.

Comments: This area should have a closer look when delineating wetlands.

Determined by: Kim M. Galt

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: Parcel 549
State: _____ County: _____ Legal Description: _____ Township: _____ Range: _____
Date: Sep. 18, 1991 Plot No.: 3 Section: _____

Vegetation (list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)). Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. Liquidambar styraciflua (FAC)		7. Canna arundinacea (FACW)	
2. Ulmus americana (FACW-)		8. Polystichum acrostichoides (FACW)	
3. Acer rubrum (FAC)		9. Arisaema triphyllum (FACW-)	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. Sambucus canadensis (FACW-)		10. Smilax rotundifolia (FAC)	
5. Asimina triloba (FACW+)		11. Lonicera japonica (FACW)	
6. Lindera benzoin (FACW-)		12. Parthenocissus quinquefolia (FACW)	

% of species that are OBL, FACW, and/or FAC: 50% Other indicators: _____

Hydrophytic vegetation: Yes _____ No _____. Basis: This applies to lower portion of the scale. Upper portion more clearly hydrophytic.

Soil

Series and phase: S₁E On hydric soils list? Yes _____; No X.

Mottled: Yes X; No _____. Mottle color: rust; Matrix color: 2.5Y 5/2

Gleyed: Yes _____ No X Other indicators: oxidized rhizospheres

Hydric soils: Yes X No _____. Basis: chroma < 2 with mottles

Hydrology

Inundated: Yes X; No _____. Depth of standing water: non found

Saturated soils: Yes X; No _____. Depth to saturated soil: 12"

Other indicators: _____

Wetland hydrology: Yes X; No _____. Basis: _____

Atypical situation: Yes _____; No X.

Normal Circumstances? Yes X No _____.

Wetland Determination: Wetland X; Nonwetland _____

Comments:

The lower portion of the scale is dominated by upland vegetation in places, and therefore may be arguably non-inundational.

Determined by: the map

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: Parcel 549
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: Sep 18, 1991 Plot No.: 4 Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <u>Liquidambar styraciflua (FAC)</u>		7. <u>Pilea fontana (FACW)</u>	
2. <u>Platanus occidentalis (FACW)</u>		8. <u>Cinna arundinacea (FACW)</u>	
3. <u>Ulmus americana (FACW)</u>		9. <u>Boehmeria cylindrica (FACW)</u>	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <u>Lindera benzoin (FACW)</u>		10. <u>Toxicodendron radicans (FAC)</u>	
5. <u>Asimina triloba (FACW)</u>		11. <u>Lonicera japonica (FAC)</u>	
6. <u>Carpinus caroliniana</u>		12. <u>Smilax rotundifolia (FAC)</u>	
% of species that are OBL, FACW, and/or FAC: <u>>50%</u> Other indicators: _____			
Hydrophytic vegetation: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Basis: <u>Dominance</u>			

Soil
Series and phase: Mixed alluvial loam On hydric soils list? Yes ☒; No ☐
Mottled: Yes ☒; No ☐ Mottle color: 10YR 6/1; Matrix color: 10YR 4/1
Gleyed: Yes ☒ No ☐ Other indicators: _____
Hydric soils: Yes ☒ No ☐; Basis: low chroma matrix

Hydrology
Inundated: Yes ☒; No ☐ In place along channel Depth of standing water: _____
Saturated soils: Yes ☒; No ☐ Depth to saturated soil: _____
Other indicators: _____
Wetland hydrology: Yes ☒; No ☐ Basis: obvious inundation in places
Atypical situation: Yes ☐; No ☒
Normal Circumstances? Yes ☒ No ☐
Wetland Determination: Wetland ☒; Nonwetland ☐
Comments: channel: sandy bottom to 10' wide, 2'-3' deep.

Determined by: For M. M. Int

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: Parcel 549
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: Sep. 18, 1991 Plot No.: 4a Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. Liquidambar styraciflua (FAC)		7. Pilea fontana (FACW)	
2.		8. Thelypteris noveboracensis (FAC)	
3.		9. Arisaema triphyllum (FACW)	
<u>Saplings/shrubs</u>		<u>Woody vines</u> N/A	
4. Carpinus caroliniana (FAC)		10.	
5. Lindera benzoin (FACW)		11.	
6. Acer rubrum (FAC)		12.	
% of species that are OBL, FACW, and/or FAC: <u>70%</u> Other indicators: _____			
Hydrophytic vegetation: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Basis: <u>dominance</u>			

Soil

Series and phase: Sassafras BWadph on hydric soils list? Yes ☐; No ☒
Mottled: Yes ☐; No ☐ Mottle color: rust; Matrix color: 5G Y5/1
Gleyed: Yes ☒ No ☐ Other indicators: oxidized rhizospheres
Hydric soils: Yes ☒ No ☐ Basis: Matrix chrome < 2

Hydrology

Inundated: Yes ☒; No ☐ Depth of standing water: in places, to surface
Saturated soils: Yes ☒; No ☐ Depth to saturated soil: within root zone
Other indicators: drift lines / absent leaf litter / standing water
Wetland hydrology: Yes ☒; No ☐ Basis: obvious signs
Atypical situation: Yes ☐; No ☒
Normal Circumstances? Yes ☒ No ☐
Wetland Determination: Wetland ☒; Nonwetland ☐

Comments:

Likely the result of spring seep.

Determined by: John M. McCarty

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: Parcel 549
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: Sept 18, 1991 Plot No.: 46 Section: _____

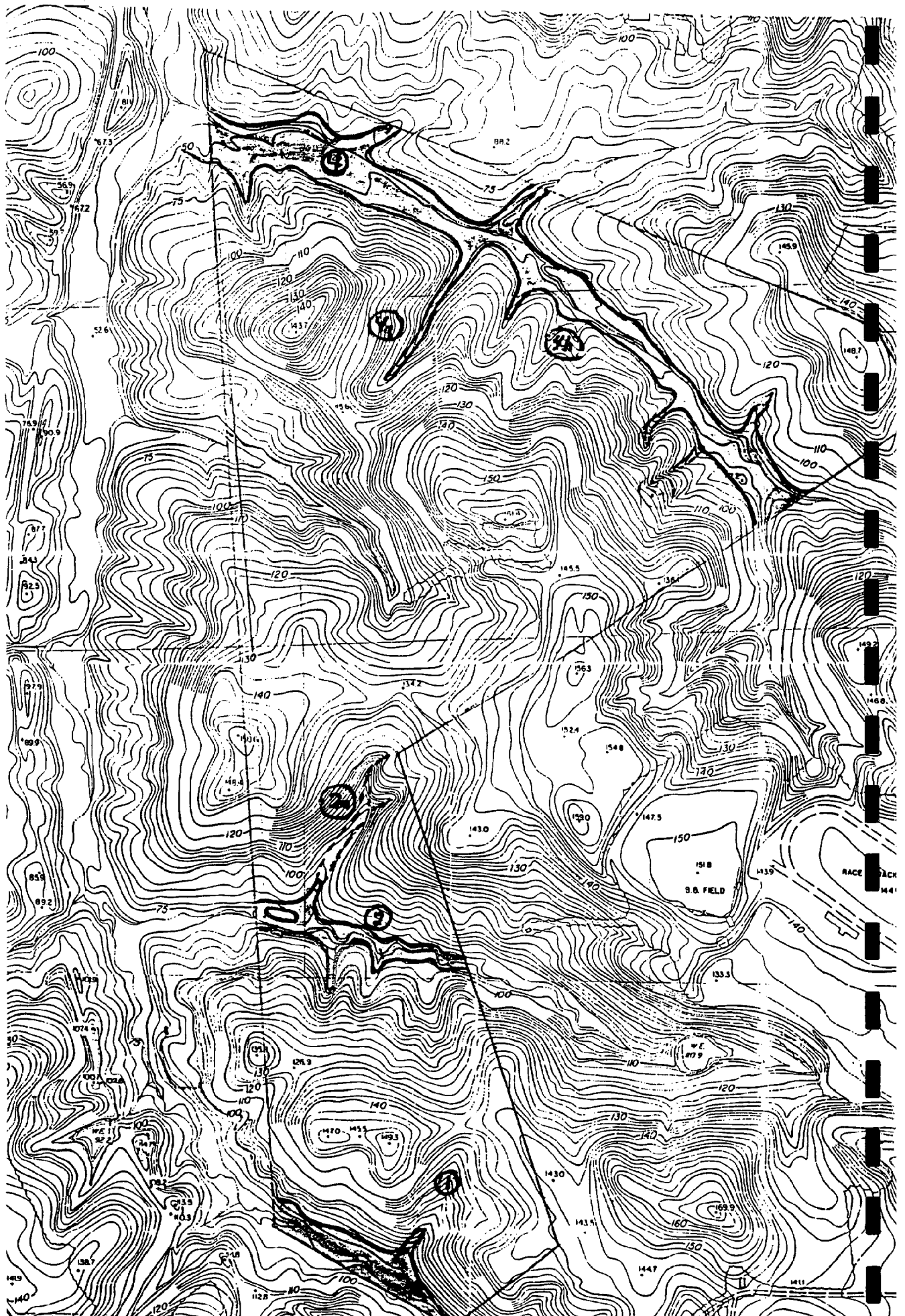
Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

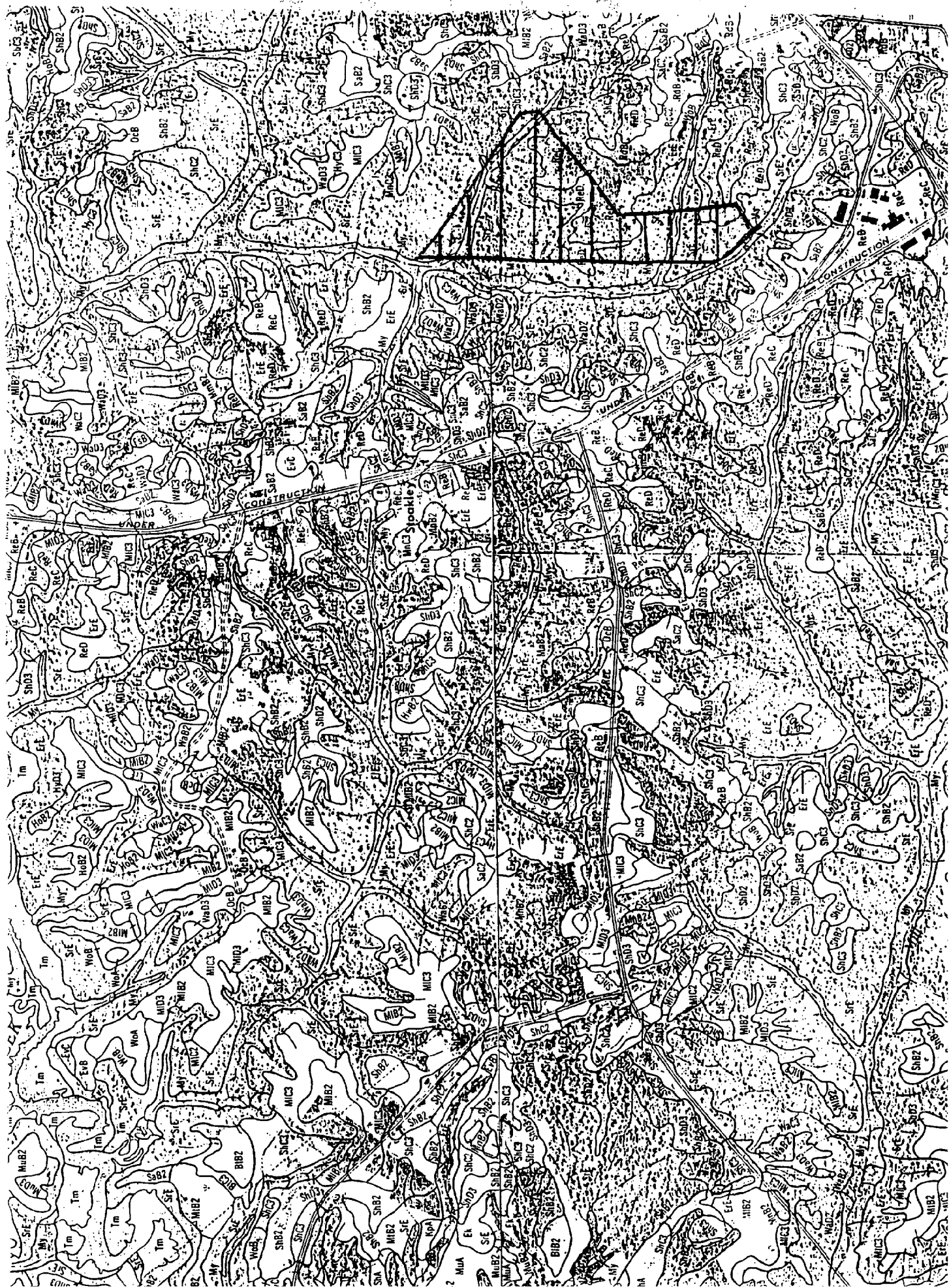
<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. Liquidambar styraciflua (=L)		7. Trifolium sp.	----
2. Liriodendron tulipifera (FACU)		8.	
3.		9.	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. Asimina triloba (FACU)		10. Emonymus obovatus (UPL)	
5. Viburnum acerifolium (UPL)		11.	
6. Fagus grandifolia		12.	
% of species that are OBL, FACW, and/or FAC: <u>20%</u> . Other indicators: <u>None</u> . Hydrophytic vegetation: Yes ___ No <u>✓</u> . Basis: _____			

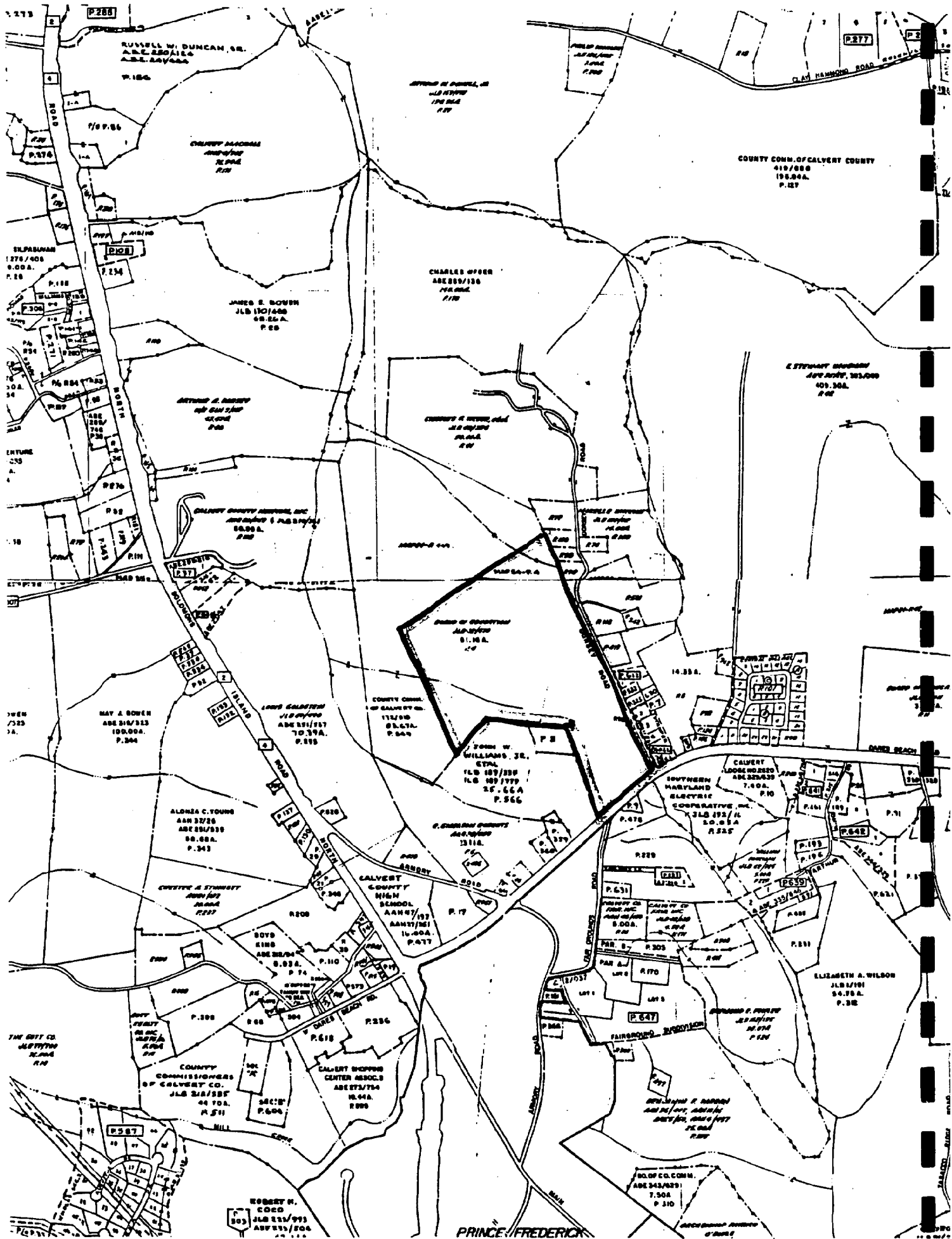
Soil Sassafras end
Series and phase: Uastphalia On hydric soils list? Yes ___; No ✓.
Mottled: Yes ___; No ✓. Mottle color: _____; Matrix color: 10 YR 5/4.
Gleyed: Yes ___ No ✓ Other indicators: _____
Hydric soils: Yes ___ No ✓; Basis: _____

Hydrology
Inundated: Yes ___; No ✓. Depth of standing water: _____
Saturated soils: Yes ___; No ✓. Depth to saturated soil: _____
Other indicators: None
Wetland hydrology: Yes ___; No ✓. Basis: No visible evidence
Atypical situation: Yes ___; No ✓
Normal Circumstances? Yes ✓ No ___
Wetland Determination: Wetland _____; Nonwetland ✓
Comments:

Determined by: Kim M. McLeod







DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert Cliffs Application Number: _____ Project Name: High School
State: _____ County: _____ Legal Description: _____ Township: _____ Range: _____
Date: Sep 27, 1991 Plot No.: 2 Section: _____

Vegetation (list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)). Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <i>Platanus occidentalis</i> (FACW)		7. <i>Doellingeria cylindrica</i> (FACW)	
2. <i>Liquidambar styraciflua</i> (FAC)		8. <i>Cimicifuga racemosa</i> (FACW)	
3. <i>Salix nigra</i> (FACW)		9. <i>Pilea fontana</i> (FACW)	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Carpinus caroliniana</i> (FACW)		10. <i>Lonicera japonica</i> (FAC)	
5. <i>Lindera benzoin</i> (FACW)		11. <i>Toxicodendron radicans</i> (FAC)	
6. _____		12. <i>Parthenocissus quinquefolia</i> (FACW)	

% of species that are OBL, FACW, and/or FAC: 80% Other indicators: _____
Hydrophytic vegetation: Yes ☒ No ☐ Basis: dominance

Soil

Series and phase: Waukegan On hydric soils list? Yes ☐; No ☒
Mottled: Yes ☒; No ☐ Mottle color: 10YR 4/1; Matrix color: 2.5Y 4/2
Gleyed: Yes ☐ No ☒ Other indicators: _____
Hydric soils: Yes ☒ No ☐ Basis: chroma 2 with mottles

Hydrology

Inundated: Yes ☒; No ☐ Depth of standing water: _____
Saturated soils: Yes ☒; No ☐ Depth to saturated soil: _____
Other indicators: flowing stream
Wetland hydrology: Yes ☒; No ☐ Basis: _____
Atypical situation: Yes ☐; No ☒
Normal Circumstances? Yes ☒ No ☐
Wetland Determination: Wetland ☒; Nonwetland ☐

Comments: spring seep and surface water flowing in channel.

Determined by: Don W. Ragsdale

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: High school
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: Sept. 27, 1991 Plot No.: 3 Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <i>Platanus occidentalis</i> (FACW)		7. <i>Canna arundinacea</i> (FACW)	
2. <i>Ulmus americana</i> (FACW)		8. <i>Lobelia cardinalis</i> (FACW)	
3. <i>Rosa carolina</i> (FAC)		9. <i>Boehmeria cylindrica</i> (FACW)	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Carpinus caroliniana</i> (FAC)		10. <i>Tournefortia repens</i> (FAC)	
5. <i>Lindera benzoin</i> (FACW)		11. <i>Lonicera japonica</i> (FAC-)	
6. _____		12. <i>Smilax glauca</i> (FAC)	

% of species that are OBL, FACW, and/or FAC: 22% Other indicators: _____
Hydrophytic vegetation: Yes ☒ No ☐ Basis: _____

Soil

Series and phase: Mixed alluvial loam On hydric soils list? Yes ☒; No ☐
Mottled: Yes ☒; No ☐ Mottle color: _____; Matrix color: Black
Gleyed: Yes ☐ No ☐ Other indicators: Black granules in soil
Hydric soils: Yes ☒ No ☐ Basis: _____

Hydrology

Inundated: Yes ☒; No ☐ Depth of standing water: to surface
Saturated soils: Yes ☒; No ☐ Depth to saturated soil: surface
Other indicators: _____
Wetland hydrology: Yes ☒; No ☐ Basis: obvious signs
Atypical situation: Yes ☐; No ☒
Normal Circumstances? Yes ☒ No ☐
Wetland Determination: Wetland ☒; Nonwetland ☐

Comments: This area is derived by spring seepage.

Determined by: J. M. B. B. B.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: High school
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: _____ Plot No.: 4 Section: _____

Vegetation (list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)). Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <i>Acer rubrum</i> (FAC)		7. <i>Osmunda cinnamomea</i> (FACW)	
2. <i>Liquidambar styraciflua</i> (FAC)		8. <i>Boehmeria cylindrica</i> (FACW)	
3. <i>Nyssa sylvatica</i> (FAC)		9. <i>Oncoclea sensibilis</i> (FACW)	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Carpinus caroliniana</i> (FAC)		10. <i>Lonicera japonica</i> (FAC)	
5. <i>Vaccinium corymbosum</i> (FACW)		11. <i>Silene latifolia</i> (FAC)	
6. <i>Rosa palustris</i> (OPL)		12. _____	

% of species that are OBL, FACW, and/or FAC: 0% Other indicators: _____
Hydrophytic vegetation: Yes ☒ No ☐ Basis: dominance

Soil

Series and phase: Sandhills On hydric soils list? Yes ☐; No ☒
Mottled: Yes ☒; No ☐ Mottle color: 10YR 5/1; Matrix color: 2.5Y 5/2
Gleyed: Yes ☐ No ☒ Other indicators: _____
Hydric soils: Yes ☒ No ☐ Basis: Mollic chronosequence with mottles

Hydrology

Inundated: Yes ☒; No ☐ Depth of standing water: _____
Saturated soils: Yes ☒; No ☐ Depth to saturated soil: 2-5 cm
Other indicators: Blackened leaves
Wetland hydrology: Yes ☒; No ☐ Basis: obvious signs
Atypical situation: Yes ☐; No ☒
Normal Circumstances? Yes ☒ No ☐
Wetland Determination: Wetland 1; Nonwetland _____

Comments: carries ground water discharge as well as surface runoff.

Determined by: Tim M. M. J.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: High School
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: 9/27/91 Plot No.: 5 Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <i>Acer rubrum</i> (FAC)		7. <i>Thelypteris novaeboracensis</i> (FAC)	
2. <i>Nyssa sylvatica</i> (FAC)		8. <i>Pilea fontana</i> (FACW)	
3.		9. <i>Lycopus virginianicus</i> (OBL)	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Carpinus caroliniana</i> (FAC)		10. <i>Smilax rotundifolia</i> (FAC)	
5. <i>Lindera benzoin</i> (FACW)		11. <i>Lonicera japonica</i> (FAC-)	
6. <i>Asimina triloba</i> (FACW)		12.	
% of species that are OBL, FACW, and/or FAC: _____. Other indicators: _____.			
Hydrophytic vegetation: Yes ____ No _____. Basis: _____.			

Soil

Series and phase: Tveshoro On hydric soils list? Yes ____; No ☒
Mottled: Yes ☒; No _____. Mottle color: rust; Matrix color: 2.5Y5/2.
Gleyed: Yes ____ No ☒ Other indicators: _____.
Hydric soils: Yes ☒ No ____; Basis: Matrix chrome S2 with mottles

Hydrology

Inundated: Yes ☒; No _____. Depth of standing water: flaring.
Saturated soils: Yes ☒; No _____. Depth to saturated soil: surface.
Other indicators: _____.
Wetland hydrology: Yes ☒; No _____. Basis: _____.
Atypical situation: Yes ____; No ☒.
Normal Circumstances? Yes ☒ No _____.
Wetland Determination: Wetland ☒; Nonwetland _____.

Comments:

Determined by: Jim M. McE

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: High School
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: 9/27/91 Plot No.: 6 Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

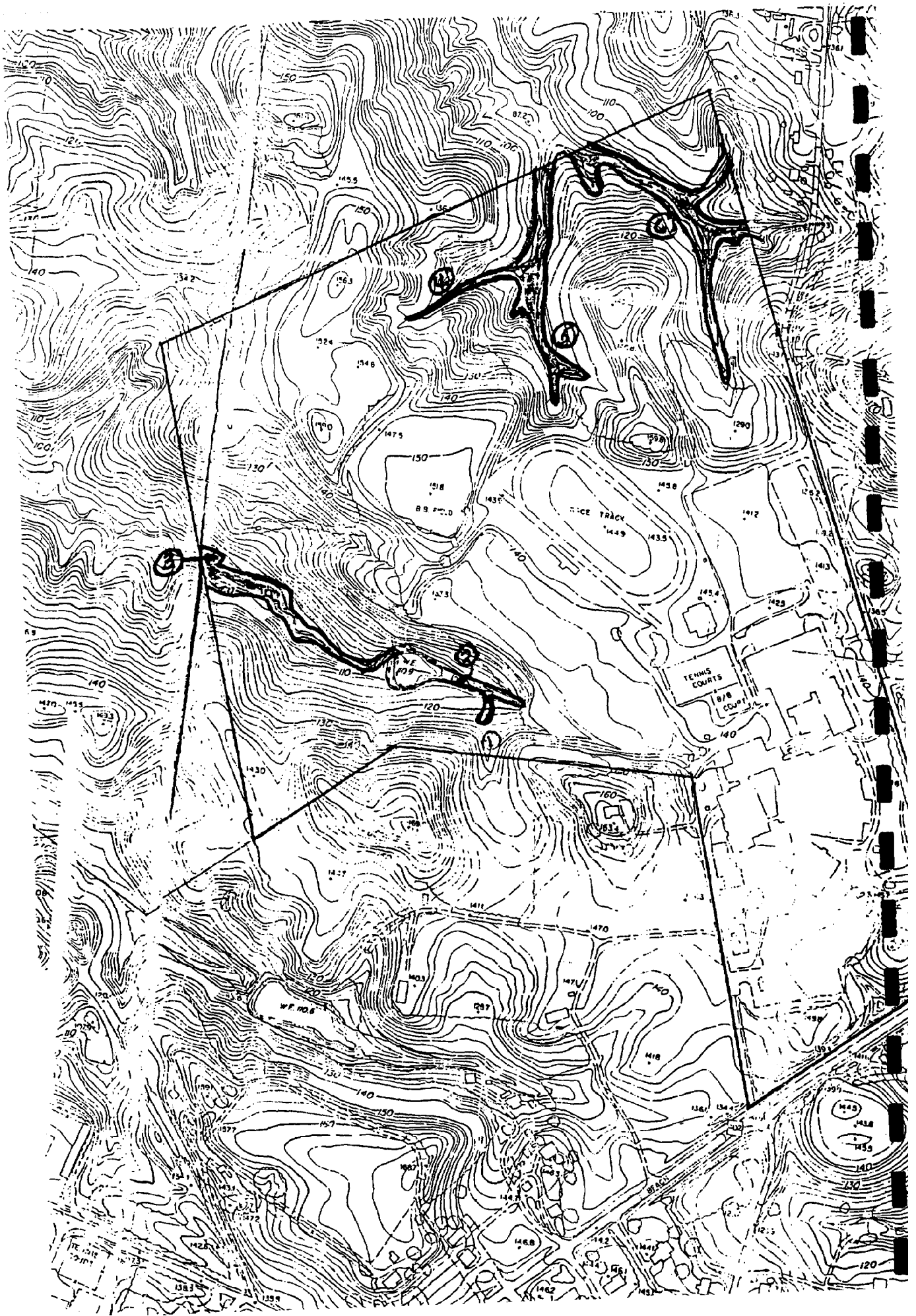
<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <u>Liquidambar styraciflua (FAC)</u>		7. <u>Thelypteris noveboracensis (FAC)</u>	
2. <u>Ulmus americana (FACW)</u>		8. _____	
3. <u>Platanus occidentalis (FACW)</u>		9. _____	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <u>Carpinus caroliniana (FACW)</u>		10. <u>Toxicodendron radicans (FAC)</u>	
5. _____		11. <u>Lonicera japonica (FAC-)</u>	
6. _____		12. <u>Rubus hispidus (FAC)</u>	
Z of species that are OBL, FACW, and/or FAC: <u>90%</u> Other indicators: _____			
Hydrophytic vegetation: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Basis: _____			

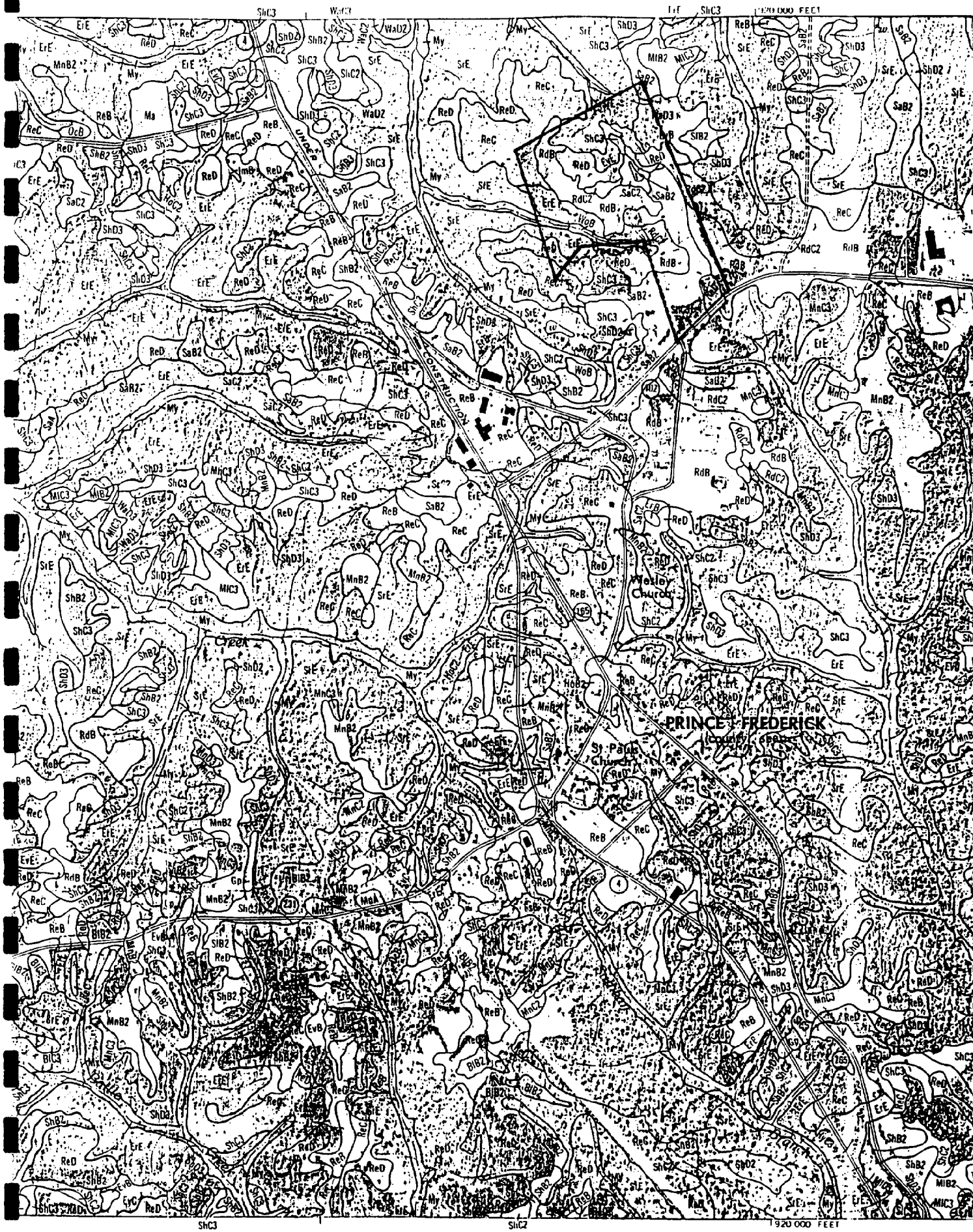
Soil
Series and phase: Sassafras & wastphelia On hydric soils list? Yes ☐; No ☒
Mottled: Yes ☒; No ☐ Mottle color: DYR 2/2; Matrix color: DYR 3/1
Gleyed: Yes ☐ No ☐ Other indicators: _____
Hydric soils: Yes ☒ No ☐ Basis: _____

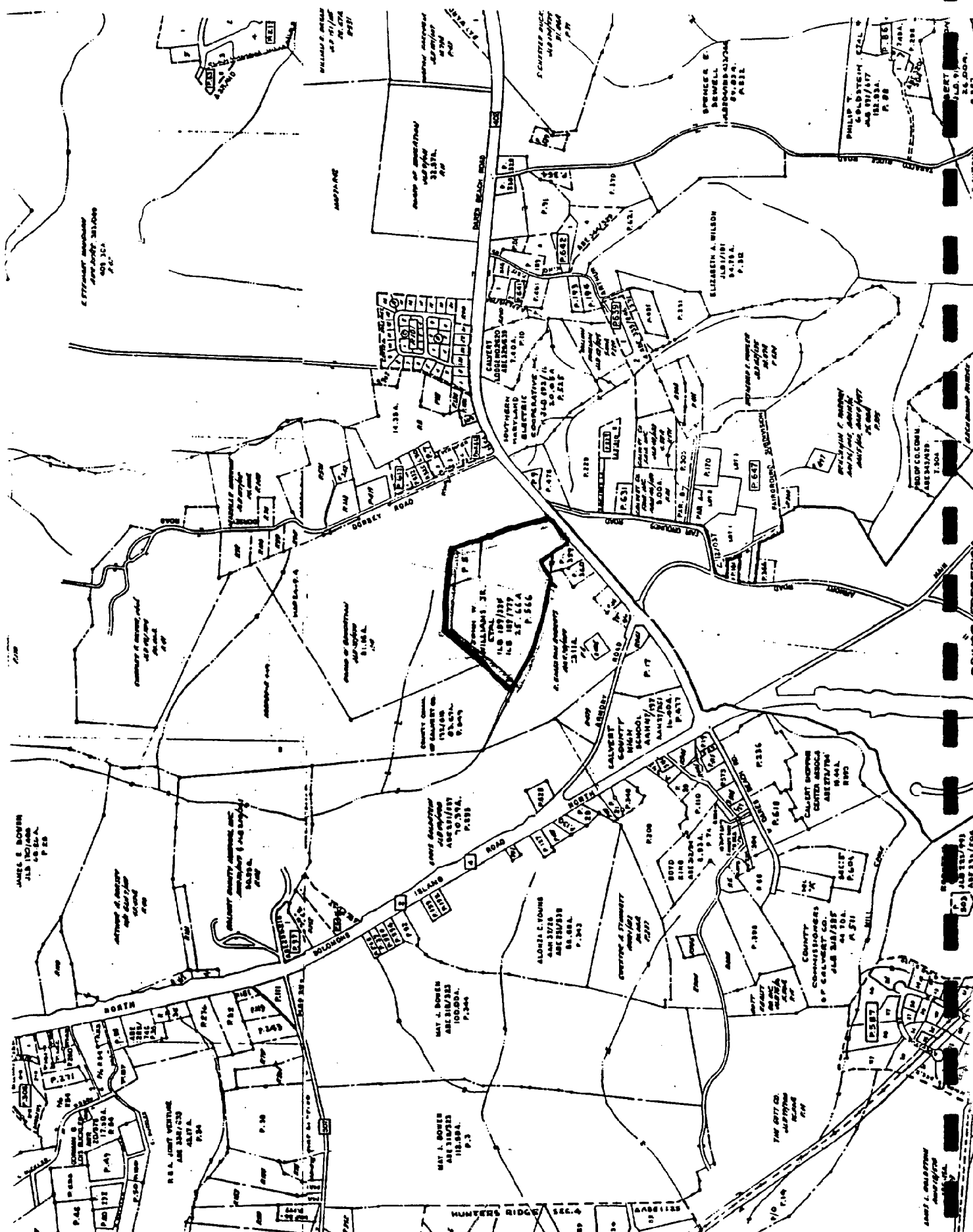
Hydrology
Inundated: Yes ☒; No ☐ Depth of standing water: Flowing
Saturated soils: Yes ☒; No ☐ Depth to saturated soil: Surface
Other indicators: _____
Wetland hydrology: Yes ☒; No ☐ Basis: _____
Atypical situation: Yes ☐; No ☒
Normal Circumstances? Yes ☒ No ☐
Wetland Determination: Wetland ☒; Nonwetland ☐

Comments:

Determined by: [Signature]







DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Parcel: 566
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: Sep 27, 1991 Plot No.: 1 Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <i>Liriodendron tulipifera</i> (FACu)		7. <i>Allium canadense</i> (FACu)	
2. <i>Carya tomentosa</i> (UPL)		8.	
3.		9.	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Carpinus caroliniana</i> (FAC)		10. <i>Lonicera japonica</i> (FAC-)	
5. <i>Cornus florida</i> (FACu)		11. <i>Parthenocissus quinquefolia</i> (FACu)	
6. <i>Viburnum acerifolium</i> (UPL)		12. <i>Mitchella repens</i> (FACu)	
% of species that are OBL, FACW, and/or FAC: <u>10%</u> Other indicators: <u>None</u> . Hydrophytic vegetation: Yes _____ No <input checked="" type="checkbox"/> Basis: _____			

Soil
Series and phase: Sassafras and Westphalia On hydric soils list? Yes _____; No ☒
Mottled: Yes _____; No ☒ Mottle color: _____; Matrix color: 10YR 4/6
Gleyed: Yes _____ No ☒ Other indicators: None
Hydric soils: Yes _____ No ☒ Basis: Chroma value > 2

Hydrology
Inundated: Yes _____; No ☒ Depth of standing water: _____
Saturated soils: Yes _____; No ☒ Depth to saturated soil: _____
Other indicators: None
Wetland hydrology: Yes _____; No ☒ Basis: _____
Atypical situation: Yes _____; No ☒
Normal Circumstances? Yes ☒ No _____
Wetland Determination: Wetland _____; Nonwetland ☒

Comments:

Determined by: Kim M. [Signature]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Parcel # 5-66
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: Sep. 27, 1991 Plot No.: 2 Section: Above pond

Vegetation (list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)). Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <i>Platanus occidentalis</i> (FACW)		7. <i>Cinna arundinacea</i> (FACW)	
2. <i>Fraxinus pennsylvanica</i> (FACW)		8. <i>Polygonum sagittatum</i> (OBL)	
3. <i>Taxodium distichum</i> (OBL)		9. <i>Impatiens capensis</i> (FACW)	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Alnus serrulata</i> (OBL)		10.	
5. <i>Lindera benzoin</i> (FACW)		11.	
6.		12.	

% of species that are OBL, FACW, and/or FAC: 100% Other indicators: _____
Hydrophytic vegetation: Yes ☒ No ☐ Basis: _____

Soil

Series and phase: _____ On hydric soils list? Yes ☐; No ☐
Mottled: Yes ☐; No ☐ Mottle color: _____; Matrix color: _____
Gleyed: Yes ☐ No ☐ Other indicators: _____
Hydric soils: Yes ☐ No ☐ Basis: _____

Hydrology

Inundated: Yes ☒; No ☐ Depth of standing water: surface
Saturated soils: Yes ☒; No ☐ Depth to saturated soil: _____
Other indicators: _____
Wetland hydrology: Yes ☒; No ☐ Basis: obvious signs
Atypical situation: Yes ☐; No ☒
Normal Circumstances? Yes ☒ No ☐
Wetland Determination: Wetland ☒; Nonwetland ☐

Comments: Bald cypress is a species of special state concern.

Determined by: Ron M. Mitty
B2

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Parcel 566
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: _____ Plot No.: 3 Section: Below Pond

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <i>Platanus occidentalis</i> (FACW)		7. <i>Boehmeria cylindrica</i> (FACW)	
2. <i>Ulmus americana</i> (FACW)		8. <i>Impatiens capensis</i> (FACW)	
3. <i>Liquidambar styraciflua</i> (FAC)		9.	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Alnus serrulata</i> (OBL)		10. N/A	
5. <i>Lindera benzoin</i> (FACW)		11.	
6. <i>Acer rubrum</i> (FAC)		12.	

% of species that are OBL, FACW, and/or FAC: 100% Other indicators: _____
Hydrophytic vegetation: Yes ☒ No ☐ Basis: _____

Soil

Series and phase: Mixed alluvial On hydric soils list? Yes ☒; No ☐
Mottled: Yes ☒; No ☐ Mottle color: rust; Matrix color: 2.5Y4/2
Gleyed: Yes ☐ No ☒ Other indicators: _____
Hydric soils: Yes ☒ No ☐; Basis: chroma value < 2 with mottles

Hydrology

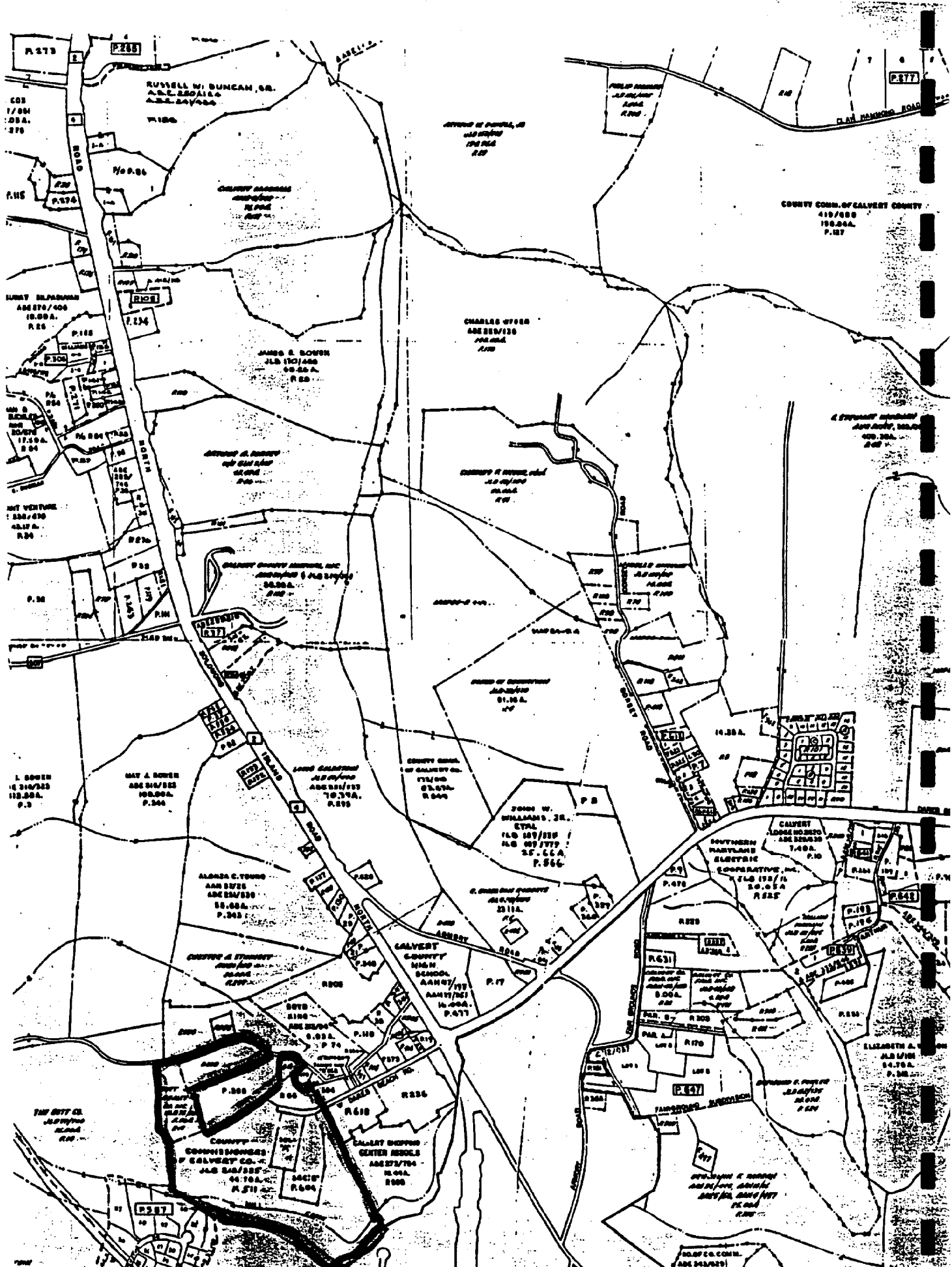
Inundated: Yes ☒; No ☐ Depth of standing water: _____
Saturated soils: Yes ☒; No ☐ Depth to saturated soil: _____
Other indicators: _____
Wetland hydrology: Yes ☒; No ☐ Basis: obvious signs
Atypical situation: Yes ☐; No ☒
Normal Circumstances? Yes ☒ No ☐
Wetland Determination: Wetland ☒; Nonwetland ☐

Comments:

Determined by: Kim M. McHugh







DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Land: South of Radio Drive
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: 9/29/91 Plot No.: 1 Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk. Vegetation adjacent to channel

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <i>Fagus grandifolia</i> (FACu)		7. <i>Thelypteris noveboracensis</i> (FAC)	
2. <i>Liriodendron tulipifera</i> (FACu)		8. <i>Polystichum acrostichoides</i> (FACu)	
3. <i>Liquidambar styraciflua</i> (FAC)		9.	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Cornus florida</i> (FACu)		10. <i>Smilax rotundifolia</i> (FAC)	
5. <i>Ilex opaca</i> (FACu)		11. <i>Mitella repens</i> (FACu)	
6. <i>Cypripus caroliniana</i> (FAC)		12.	

% of species that are OBL, FACW, and/or FAC: 25% Other indicators: _____
Hydrophytic vegetation: Yes _____ No ☒ Basis: _____

Soil Sassafras and
Series and phase: Westphalia On hydric soils list? Yes _____; No ☒
Mottled: Yes ☒; No _____. Mottle color: 10YR 4/6; Matrix color: 2.5Y 4/3.
Gleyed: Yes _____ No ☒ Other indicators: None
Hydric soils: Yes _____ No ☒ Basis: Matrix chroma > 2

Hydrology limited to base of channel:
Inundated: Yes ☒; No _____. Depth of standing water: flowing water.
Saturated soils: Yes _____; No _____. Depth to saturated soil: _____
Other indicators: _____
Wetland hydrology: Yes ☒; No _____. Basis: _____
Atypical situation: Yes _____; No ☒
Normal Circumstances? Yes ☒ No _____.
Wetland Determination: Wetland _____; Nonwetland ☒

Comments: This would be considered jurisdictional waters of the U.S. though not a wetland in most places.

Determined by: the M. M. Corp

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Lands south Name: of Radio Drive
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: _____ Plot No.: 2 Section: _____

Vegetation (list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)). Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <i>Acer rubrum</i> (FAC)		7. <i>Cinna arundinacea</i> (FACW)	
2. <i>Liquidambar styraciflua</i> (FAC)		8. <i>Arisaema triphyllum</i> (FACW)	
3. <i>Ulmus americana</i> (FACW)		9. <i>Boehmeria cylindrica</i> (FACW)	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Lindera benzoin</i> (FACW)		10. <i>Smilax rotundifolia</i> (FAC)	
5. <i>Carpinus caroliniana</i> (FACW)		11. <i>Toxicodendron radicans</i> (FAC)	
6. <i>Vaccinium corymbosum</i> (FACW)		12. <i>Campsis radicans</i> (FAC)	
% of species that are OBL, FACW, and/or FAC: <u>90%</u> . Other indicators: _____.			
Hydrophytic vegetation: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> . Basis: <u>Dominance</u> .			

Soil Sassafras and
Series and phase: Westphalia On hydric soils list? Yes ☐; No ☒.
Mottled: Yes ☒; No ☐. Mottle color: 10YR 4/1; Matrix color: 10YR 4/2.
Gleyed: Yes ☐ No ☒ Other indicators: organic staining.
Hydric soils: Yes ☒ No ☐; Basis: _____.

Hydrology
Inundated: Yes ☐; No ☒. Depth of standing water: _____.
Saturated soils: Yes ☒; No ☐. Depth to saturated soil: 6".
Other indicators: Seaming / light lines / Alluvial deposits.
Wetland hydrology: Yes ☒; No ☐. Basis: _____.
Atypical situation: Yes ☐; No ☒.
Normal Circumstances? Yes ☒ No ☐.
Wetland Determination: Wetland ☒; Nonwetland ☐.

Comments: This area is receiving greater flow rates due to surrounding developed land.

Determined by: Kim M. M. L. J.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: Leads to the South of Radio Road
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: 9/29/91 Plot No.: 3 Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
<u>Trees</u>		<u>Herbs</u>	
1. <i>Fagus grandifolia</i> (FACW)		7. <i>Polystichum acrostichoides</i> (FACW)	
2. <i>Quercus alba</i> (FACW)		8.	
3. <i>Liriodendron tulipifera</i> (FACW)		9.	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <i>Albizia julibrissin</i> (UPL)		10. <i>Lonicera japonica</i> (FAC-)	
5. <i>Viburnum prunifolium</i> (FACW)		11.	
6. <i>Ilex opaca</i> (FACW)		12.	

% of species that are OBL, FACW, and/or FAC: 20%. Other indicators: _____
Hydrophytic vegetation: Yes _____ No ☒ Basis: _____

Soil

Series and phase: Matapoke On hydric soils list? Yes _____; No ☒
Mottled: Yes _____; No ☒ Mottle color: _____; Matrix color: 10YR5/4
Gleyed: Yes _____ No ☒ Other indicators: None
Hydric soils: Yes _____ No ☒ Basis: Matrix > chroma 2

Hydrology

Inundated: Yes _____; No ☒ Depth of standing water: _____
Saturated soils: Yes _____; No ☒ Depth to saturated soil: _____
Other indicators: slight seeping / some exposed roots
Wetland hydrology: Yes _____; No ☒ Basis: well drained area
Atypical situation: Yes _____; No ☒
Normal Circumstances? Yes ☒ No _____

Wetland Determination: Wetland _____; Nonwetland ☒

Comments: This is a close call on jurisdictional waters of U.S. and should be reviewed by proper regulatory agencies.

Determined by: Kim M. [signature]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: Calvert County Application Number: _____ Project Name: Land South of Radio Road
State: MD County: Calvert Legal Description: _____ Township: _____ Range: _____
Date: 9/29/91 Plot No.: 4 Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

<u>Species</u>	<u>Indicator Status</u>	<u>Species</u>	<u>Indicator Status</u>
<u>Trees</u>		<u>Herbs</u>	
1. <u>None</u>		7. <u>Polygonum sagittatum (OBL)</u>	
2.		8. <u>Cinna arundinacea (FACW)</u>	
3.		9. <u>Impatiens capensis (FACW)</u>	
<u>Saplings/shrubs</u>		<u>Woody vines</u>	
4. <u>Liquidambar styraciflua (FAC)</u>		10. <u>Mikania scandens (FACW)</u>	
5. <u>Platanus occidentalis (FACW)</u>		11.	
6.		12.	

% of species that are OBL, FACW, and/or FAC: 100% Other indicators: _____
Hydrophytic vegetation: Yes ☒ No ☐ Basis: _____

Soil

Series and phase: Eroded land On hydric soils list? Yes ☐; No ☒
Mottled: Yes ☐; No ☒ Mottle color: _____; Matrix color: Black
Gleyed: Yes ☐ No ☐ Other indicators: Muck
Hydric soils: Yes ☒ No ☐ Basis: _____

Hydrology

Inundated: Yes ☒; No ☐ Depth of standing water: Surface
Saturated soils: Yes ☒; No ☐ Depth to saturated soil: _____
Other indicators: _____
Wetland hydrology: Yes ☒; No ☐ Basis: Permanent saturation
Atypical situation: Yes ☐; No ☒
Normal Circumstances? Yes ☒ No ☐
Wetland Determination: Wetland ☒; Nonwetland ☐

Comments:

Determined by: Jim M. McCoy



APPENDIX B

RECEIVED SEP 22 1991

CONSENT FORM FOR ACCESS

I/we give my/our consent to allow access of the Calvert County Department of Planning and Zoning's environmental consultant onto our property identified below for the purpose of conducting a gross wetland delineation. I/we understand that vegetation will not be cut or flagging left on the site and that all work will be completed by the end of September, 1991.

9/19/91
Date

[Signature]
Property Owner or Agent's Signature

Date

Co-owner's signature

PROPERTY OWNERS NAME AND ADDRESS:

Calvert Association for Retarded Citizens
355 W. Dares Beach Road
Prince Frederick, MD 20678

PROPERTY DESCRIPTION: TAX MAP NO. 24 PARCEL NO. 66

Fold this form into thirds, staple or tape secure and return to Planning & Zoning (postage provided). If consent is denied, please return blank form without signatures.

CONSENT FORM FOR ACCESS

I/we give my/our consent to allow access of the Calvert County Department of Planning and Zoning's environmental consultant onto our property identified below for the purpose of conducting a gross wetland delineation. I/we understand that vegetation will not be cut or flagging left on the site and that all work will be completed by the end of September, 1991.

9-17-91
Date

The Gott Co
Property Owner or Agent's Signature

Date

Co-owner's signature

PROPERTY OWNERS NAME AND ADDRESS:

The Gott Company
Rte 2/4
Prince Frederick, MD 20678

PROPERTY DESCRIPTION: TAX MAP NO. 24 PARCEL NO. 14 & 15


Fold this form into thirds, staple or tape secure and return to Planning & Zoning (postage provided). If consent is denied, please return blank form without signatures.

RECEIVED SEP 18 1991

CONSENT FORM FOR ACCESS

I/we give my/our consent to allow access of the Calvert County Department of Planning and Zoning's environmental consultant onto our property identified below for the purpose of conducting a gross wetland delineation. I/we understand that vegetation will not be cut or flagging left on the site and that all work will be completed by the end of September, 1991.

Sept 13-1991
Date


Property Owner or Agent's Signature

Date

Co-owner's signature

PROPERTY OWNERS NAME AND ADDRESS:

Mr. John Williams, Jr.
2715 Hollowing Point Rd.
Prince Frederick, MD 20678

PROPERTY DESCRIPTION: TAX MAP NO. 24 PARCEL NO. 566 & 5

APPENDIX C

**PATUXENT ESTUARY DEMONSTRATION PROJECT
PHASE II PLANNING GRANT
FOR
CALVERT COUNTY**

**DEPARTMENT OF PLANNING AND ZONING
CALVERT COUNTY**

PREPARED BY:

**DAVID C. BROWNLEE, PhD.
AND
PAUL H. DiNUNNO**

FEBRUARY 12, 1993

PHASE II PLANNING GRANT
CALVERT COUNTY

I. PROJECT OBJECTIVE

The objective of this project is to establish a nonpoint source nutrient management strategy for Calvert County. This strategy will be specific to the needs of Calvert County and be consistent with Calvert County's Comprehensive Plan. In addition, the strategy will be consistent with the Final Guidance Document produced by planning efforts of Phase II of the Patuxent Estuary Demonstration Project. The nutrient reduction goals of the "Maryland's Tributary Strategies" program will also be considered in the preparation of this strategy.

Calvert County will also proceed to amend its Comprehensive Plan as required by the State of Maryland Economic Growth, Resources Protection, and Planning Act of 1992 including sensitive area protection components. Compliance with this act will assure reduced impacts of nutrient pollution on the waters and wetlands of Calvert County.

II. WORK APPROACH

The approach will be to identify the most effective ways to manage nonpoint source nutrient pollution in Calvert County and then to implement these management strategies as far as politically and economically feasible. Stream monitoring will be used to identify problem areas and to establish or continue baseline water quality data.

A. IDENTIFICATION OF MANAGEMENT STRATEGIES

The results from the States modeling and assessment analyses of the Patuxent Estuary and from a detailed assessment analysis of a target watershed for Calvert County (i.e. Hunting Creek), will be used to identify the most efficient and effective management strategies for controlling nonpoint source nutrient pollution in Calvert County. The County will work in conjunction with the Maryland Office of Planning to evaluate the nutrient run-off characteristics in the Hunting Creek watershed using the State's Nonpoint Source Assessment and Accounting System (AAS).

Calvert County will provide MOP with many of the environmental feature maps, and zoning maps of the Hunting Creek watershed for them to use in their GIS system and with their AAS. Calvert County is proposing to purchasing a GIS system and will work with

PHASE II PLANNING GRANT
CALVERT COUNTY

MOP to achieve a technology transfer of their mapping and analysis capabilities.

During Phase I of the Patuxent Estuary Demonstration Project, Calvert County adopted (January 1, 1993) a number of growth management measures. These measures include mandatory clustering, overlay zoning of Resource Preservation Areas and Farm Community Areas and amendments to our Agriculture Preservation Program.

The AAS analysis on Hunting Creek will investigate nutrient loading based on conditions before the adoption of these growth management measures, after the adoption of these measures, and then with these measures and additional sensitive area components. These sensitive area components would include such approaches as increasing the extent of buffers, impervious surface limitations, mapping and protecting rare, threatened and endangered species habitat, etc. The results of these analyses will indicate how effective our growth management program might be at reducing nutrient loading from future development and which additional sensitive area elements should be considered. If the results are favorable, then our growth management program could be used as an example for other rural jurisdictions.

Stream monitoring will continue in Calvert County. The County will support the Chesapeake Biological Laboratory's Solomons Harbor Study, 1993. In addition, stream monitoring on Hunting Creek and Hall's creek will continue and a volunteer monitoring program will be initiated in these watersheds.

B. IMPLEMENTATION

Having identified the most efficient and effective methods of nonpoint source nutrient management using the analyses discussed above, the citizens of Calvert County and the Calvert County Government will begin to plan the implementation of the County's nonpoint source nutrient management strategy. Several planning approaches will be used.

1. PATUXENT ESTUARY DEMONSTRATION PROJECT PLANNING

Calvert County Staff will continue to serve on the Patuxent Estuary Demonstration Project "Planning Committee". Participation in the committee will include working on the refinement of the "Patuxent Estuary Demonstration Project Guidance Document".

PHASE II PLANNING GRANT
CALVERT COUNTY

2. CALVERT COUNTY COMPREHENSIVE PLANNING

During the grant period, the Calvert County Comprehensive Plan will be amended to be consistent with the State of Maryland's Economic Growth, Resources Protection, and Planning Act of 1992 including sensitive area protection components. Compliance with this act will assure reduced impacts of nutrient pollution on the waters and wetlands of Calvert County. Watershed management planning will also added to the Comprehensive Plan as a useful environmental planning tool.

3. CALVERT COUNTY WATERSHED MANAGEMENT PLANNING

Calvert County is in the process of developing (with support from the Maryland Coastal Zone Management Program) draft watershed management plans for two of its watersheds, Hunting Creek (tributary of the Patuxent River; draft completion, March 31, 1993) and Parker Creek (tributary to the Chesapeake Bay; draft completion, September 30, 1993). These two creeks make up the entire watershed for the Major Town Center of Prince Frederick, the Calvert County Seat.

A proposal has been submitted to the Maryland Coastal Zone Management program to compile the two plans into a single Prince Frederick Watershed Management Plan with Parker Creek and Hunting Creek components and to continue the watershed planning efforts on Parker Creek (see Attachment "A"). The goals of this plan will be to protect and preserve the environments of these watersheds, allow economic development and controlled growth and address the watershed concerns and issues raised by Calvert County citizens.

It is proposed as part of this grant to continue the watershed planning efforts on Hunting Creek. Calvert County will work with MOP and the Hunting Creek Watershed Management Task Force (established in the Fall of 1992) to determine the most prudent and effective methods of solving the problems identified by the MOP evaluation discussed in II.A above and in achieving the goals of the Hunting Creek Watershed Management Plan. These measures will become part of the Prince Frederick Watershed Management Plan. The plan will be written to be certifiable by the Water Resources Administration (WRA) in the Department of Natural Resources (DNR).

Consultation will also be made with all Federal, State and Local regulatory agencies to insure that the Watershed Management Plan is supported by them. At this stage the Plan, which will include proposed changes to other County plans and ordinances, will be

PHASE II PLANNING GRANT
CALVERT COUNTY

taken to the public for comment through public meetings, newspaper articles, and distribution of the plan. It is anticipated that some of the measures proposed will have only watershed-wide application while others would apply County-wide. It is expected that during the federal FY95 that the plan will go to public hearing before the Planning Commission and Board of County Commissioner for adoption.

III. THE EXPECTED WORK PRODUCTS

FIRST QUARTER

- * A list of the maps and regulations provided to MOP for their GIS mapping and analysis.
- * The agendas and minutes of the Hunting Creek Watershed Management Task Force meetings.
- * Compilation of comments received from State, Federal and local agencies on the draft Hunting Creek Watershed Task Force.

SECOND QUARTER

- * Submit proposed changes to the Comprehensive plan to bring it into compliance with the State of Maryland Economic Growth, Resources Protection, and Planning Act of 1992.

THIRD QUARTER

- * Written report on the results of the AAS analysis.
- * Proof of the technology transfer of GIS mapping and analysis methods to Calvert County.

FOURTH QUARTER

- * The results of the AAS analysis will be analyzed relative to the Calvert County Comprehensive Plan, the Calvert County Water and Sewerage Plan, the Prince Frederick Master Plan and Zoning Ordinance and the developing Prince Frederick Watershed Management Plan. This analysis will be presented in written form and will include an analysis of the estimated effectiveness of Calvert County's recent growth management measures and improvements that may be made by amending these or adding additional sensitive area measures.
- * Report on the water quality monitoring efforts.

FIFTH QUARTER

- * Revised Draft of the Hunting Creek Component of the Prince Frederick Watershed Management Plan.

PHASE II PLANNING GRANT
CALVERT COUNTY

- * Proposed changes to the Calvert County Comprehensive Plan, the Calvert County Water and Sewerage Plan, the Calvert County Zoning Ordinance, the Calvert County Subdivision regulations and the Prince Frederick Master Plan and Zoning Ordinance which would be required to add any sensitive area elements identified in the AAS analysis.

SIXTH QUARTER

- * A draft Prince Frederick Watershed Management Plan (PFWMP) with Hunting Creek and Parker Creek elements will be presented (4th quarter). This Plan will identify which County Plans, Ordinances and regulations must be amended and how they should be amended to meet the goals of the PFWMP.
- * A compilation of all comments submitted from the general public and Federal, State and local agencies on any proposed changes to County Plans and regulations.

SEVENTH QUARTER

- * The agendas and minutes of the Hunting Creek Watershed Management Task Force meetings and for any public meeting held on proposed changes to County plans and ordinances.
- * A compilation of all comments submitted from the general public and Federal, State and local agencies on any proposed changes to County Plans and regulations.

EIGHT QUARTER

- * Final Report

IV. RELATION TO OTHER ON-GOING EFFORTS?

- A. Coastal Zone Management Grants to Calvert County are being used to develop Draft Watershed Management Plans for Hunting Creek (grant completion, March 31, 1993) and Parker Creek (grant completion, September 30, 1993). This proposal would follow-up on the Hunting Creek efforts.
- B. This proposal would be a continuation of Calvert County participation in the Patuxent Estuary Demonstration Project, Phase I. Phase I funding has supported planning, data compilation on water quality and existing best management stormwater practices, stream monitoring (Hunting Creek and Halls Creek), and nonpoint source assessment in the County.

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CALVERT COUNTY

- C. Calvert County has submitted to the Maryland Coastal Zone Management Program for a Section 309 Grant to draft a Prince Frederick Watershed Management Plan with Parker Creek and Hunting Creek components.

CALVERT COUNTY

PHASE II PLANNING GRANT

BUDGET REQUEST

PATUXENT ESTUARY DEMONSTRATION PROJECT
PHASE II PLANNING GRANT

Local Jurisdiction: Calvert County

Project Title: Patuxent Estuary Demonstration Project
Phase II Planning Grant

Project Coordinator: David C. Brownlee, PhD. Phone: (410)535-2348

Proposed Budget:

	<u>Funding Requested</u>	<u>Match</u>
<u>Salaries and Fringe</u>		
Title and Hourly Rate		
a. Director (36.15/hr)		2,170
b. Deputy director (26.53)		3,184
c. Project Planner (23.54)		706
d. Environmental Planner (23.10/hr)		7,510
e. Intern (10.50/hr) 17mo. half time	13,598	
f. Drafting Supervisor (18.98/hr)		3,322
g. Rural Planner (20.15)		2,418
h. Assoc. Environmental Planner (16.99)		2,039
i. Zoning Technician (17.61)		616
g. Temp. Secr. for Task Force (8.75/hr)	400	
Total	13,998	21,965
Percentage Fringe Benefits 28%	3,919	6,150
Type of Benefits Health, Retirement, Workman's Compensation, Unemployment, FICA		
Salaries and Fringe Total	17,917	28,115
Supplies and Materials	800	165
Equipment (GIS system, hardware and software)	18,000	
Monitoring Equipment	500	
Travel, Meetings, Training	283	200
Contracted Services		
Tri-County Council	12,500	12,500
Solomons Harbor Study, 1993		5,520
Zoning Maps Prep. with New Overlays		3,500
TOTAL	50,000	50,000

PHASE II PLANNING GRANT
CALVERT COUNTY

ATTACHMENT "A"

**DEPARTMENT OF PLANNING AND ZONING
CALVERT COUNTY**

PREPARED BY:

**DAVID C. BROWNLEE, PhD.
AND
PAUL H. DiNUNNO**

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PHASE II PLANNING GRANT

CALVERT COUNTY

EXECUTIVE SUMMARY

The objectives of this study are to proceed with the watershed management planning efforts on Parker Creek and to combine both the Parker Creek and Hunting Creek Watershed Management Plans into a single Prince Frederick Watershed Management Plan. These two creeks make up the entire watershed for the Major Town Center of Prince Frederick, the Calvert County Seat. The goals of this plan will be to protect and preserve the environments of these watersheds, allow economic development and controlled growth and address the watershed concerns and issues raised by Calvert County citizens.

The combined plan will be written to be certifiable by the Water Resources Administration (WRA) in the Department of Natural Resources (DNR) and to be consistent with the State of Maryland Economic Growth, Resources Protection, and Planning Act of 1992 including sensitive area protection components. The nutrient reduction goals of the "Maryland's Tributary Strategies" program will also be considered in the preparation of this plan.

Calvert County has recently implemented a number of County-wide growth management measures. Jointly with the Maryland Office of Planning (MOP) we will evaluate the nutrient run-off characteristics in the Parker Creek watershed based on conditions before adoption of the growth management measures, with these measures, and then with additional sensitive area components. In addition, the County will work with DNR to identify and map any additional habitats of rare, threatened or endangered species in the watershed.

Calvert County will work with MOP and the Parker Creek Watershed Management Task Force to determine the most prudent and effective methods of solving the problems identified by the MOP evaluation and in achieving the goals of this project. These measures will become part of the Prince Frederick Watershed Management Plan.

Consultation will also be made with all Federal, State and Local regulatory agencies to insure that the Watershed Management Plan is supported by them. At this stage the Plan, which will include proposed changes to other County plans and ordinances, will be taken to the public for comment through public meetings, newspaper articles, and distribution of the plan. It is expected that during the federal FY95 that the plan will go to public hearing before the Planning Commission and Board of County Commissioner for adoption.

APPENDIX D

DRAFT
FOR REVIEW ONLY

HUNTING CREEK STREAM SURVEY

March 30, 1993

**Brenda Sandberg, Environmental Specialist
Tri-County Council for Southern Maryland**

For

**Planning and Zoning Department
Calvert County, Maryland**

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Introduction

The Hunting Creek watershed is a typical tributary of the Patuxent River in Calvert County that includes many diverse land uses. Its 29 square miles encompass about half of the Prince Frederick town center, as well as many square miles of rural residential housing, agricultural areas, and forest. Hunting Creek was selected for study as part of the Patuxent River Demonstration Project because it is a good representation of the many land uses in the county. In addition to this stream survey, a detailed watershed management plan is being drafted to identify the natural resources in the watershed and provide for good management practices to protect those resources.

One important element of any watershed management plan is to know the quality of the waters in the creek and its tributaries. This stream survey was undertaken to gather the necessary water quality information for the watershed management effort. A further goal is that the information contained in this report will prove useful to governing officials and the general public for efforts to improve water quality in backyard streams, the Patuxent, and ultimately the Chesapeake Bay.

A stream survey was completed on Hunting Creek in 1989 by the Tri-County Council, and much of this current study will build upon the work done in that survey (see Appendix A). That survey collected in one report data on soils, land uses, and sensitive areas in the watershed, and habitat and water quality information for twelve selected sampling sites. This report will attempt to add current water quality and habitat information for eight sampling sites.

...

Previous Water Quality Data

Three major sources of Hunting Creek data are available at this time. The most important is the comprehensive stream survey that was completed in 1989 by Michael Kakuska of the Tri-County Council for Southern Maryland. This study collected data on land use, erosion potential, sedimentation, buffers and stream substrate, in addition to water quality data on twelve sampling sites. Water quality data included nitrates and macroinvertebrate sampling, a good indicator of water quality over the long term. A summary of that data is presented in Table 1, while the rest of the report is attached in Appendix A.

The TCC survey was comprehensive in its scope to aid in locating specific problem areas in addition to assessing the overall quality of the stream. In general, this study found a variety of land uses and buffers immediately surrounding the stream, with mostly stable banks showing some natural erosion. Most of the stream beds showed sedimentation, with large amounts of sand and silt in the substrate covering any natural gravel bottoms. Algae and bacterial coatings on the streambed did not appear to be a problem in 1989. Only traces of nitrates were detected at most sites, and macroinvertebrates were generally present at levels that indicated good to fair water quality.

The second source of water quality and habitat data is the information collected through the county's environmental education program, ChesPax. High school students in environmental science classes study watershed management and water quality issues, and then spend a full day in the field filling out habitat assessment forms, testing water for chemical parameters, and sampling for macroinvertebrates in several stretches of stream. The data collected by these high school students is tabulated at the end of the day to provide them with a picture of the creek they sampled. The project coordinators have been saving this data for the last two years, yielding Hunting Creek data from the fall of 1991 and the spring and fall of 1992.

Reliability is not high with this data, but they are useful as background information for many of the stream sites this study will examine. Table 2 summarizes the habitat scores and macroinvertebrates count ratings for ChesPax sites that correspond to this survey's sampling sites. Table 3 shows data for additional sites in the Hunting Creek watershed that do not directly correspond to any of this survey's locations. Habitat scores ranged from poor to excellent, with most sites in the good and fair categories. Invertebrate index ratings were not as high, most being poor and only some fair.

ChesPax students also use LaMotte Company chemical test kits to test for dissolved oxygen, pH, phosphates and nitrates in the stream waters. These kits are colorimetric tests that utilize reagents to give a color to the sample which is then compared to standards to determine the measure. The students' results were fairly consistent with these test kits, showing good dissolved oxygen levels (usually 8-11 ppm), even pH readings (usually 6.0-7.0), and almost no traces of nitrates or phosphates at any Hunting Creek site.

[Insert Table 1 from Kakuska's paper here.]

Table 2. Habitat Assessment and Macroinvertebrate Ratings and Water Quality Tests Collected by the ChesPax Program for Comparable Hunting Creek Sites

Site Number	Habitat Ratings	Invertebrate Ratings	NO3-N (mg/l)	PO4 (mg/l)	pH	Dissolved Oxygen (ppm)
1	Fair	Poor	0	0	6	4.2
	Fair	Poor	0	0	7	9
	Good	Poor	0	0	6	7
2	Fair	Poor	0	0	7	6.5
	Fair-poor	Fair	0	0	7	7
	Fair	Poor	0	0	6	2
	Fair	Poor	0	0	7	8
4	Good	Poor	NA	NA	NA	NA
	Good	Poor	NA	NA	NA	NA
5	Fair-good	NA	NA	NA	NA	NA
	Good	NA	NA	NA	NA	NA
	Good	Fair	0	0	7	8
	Good	Fair	0	0	7	9.4
6	Good	NA	NA	NA	NA	NA
	Fair	Poor	0	0	7	NA
	Good	Poor	0.25	0.35	7	10
	Excellent	Fair	0	0	7	13

Table 3. Habitat Assessment and Macroinvertebrate Ratings and Water Quality Tests Collected by the ChesPax Program for Different Hunting Creek Sites

Location	Habitat Ratings	Invert-ebrate Ratings	NO3-N (mg/l)	PO4 (mg/l)	pH	Dissolved Oxygen (ppm)
Mill Creek at Dove Lane	Fair-good	Poor	0.1	0.02	6	8
Mill Creek at Willow Way	Good Good	NA Poor	NA 0.25	NA 0	NA 7	NA 7
Reits Branch at Bowie Shop Road	Fair Good Good	Fair Poor	0 0	0 0	6.5 7	8.5 13
Sewell Branch at Cox Road	Good-excellent Excellent	Poor Fair	0	0	6	10
Tributary at Fox Run Shopping Ctr.	Fair Fair Fair-good	Poor Poor Poor	0 0 0.25	NA 0 0	7.5 7 7	9.6 10 11
Mainstem at Plum Pt. Road	Good Good	Fair Fair	0 0	0 0	6 7.8	5 NA

The third source of information about Hunting Creek is the USGS monitoring station on the mainstem of the creek right before its confluence with the Sewell Branch. [Waiting on data...]

Current Stream Conditions

Methods

Water quality and habitat assessments were accomplished using three different techniques to collect data on 8 selected sampling sites throughout the Hunting Creek watershed. Only non-tidal, freshwater streams were sampled in this project to limit the range of parameters needing analysis. The three main techniques were a habitat assessment form, a macroinvertebrate assessment, and chemical tests for water quality.

The habitat assessment form was developed in 1991 specifically for coastal plain streams by a working group of USEPA Region III and distributed by MDE's Project Heartbeat (see Appendix C). The form requires the user to make educated judgements about factors such as sinuosity, instream habitat, pool variety, sedimentation, bank stability and vegetation, shading, and buffer zones. This form is slightly different than the form used by ChesPax, so habitat assessments are not directly comparable between the two data sources. Also, the completion of this survey by one primary individual means the scores for each sampling site are more directly comparable than if different individuals did each site. In addition to the assessment form, a one page form was used to collect information on water appearance, bed composition, odors, algae, and streambed stability.

The macroinvertebrate count form used in this study was created by the Save Our Streams program of the Izaak Walton League (see Appendix C). This form is identical to the one used by ChesPax, so macroinvertebrate ratings are directly comparable between these two sources. The basic theory behind this assessment is that certain large insect larvae and other invertebrates are very sensitive to pollution and thus are good indicator species. These creatures will take long periods to recover from short-term pollution events, so their presence or absence can tell us much about the long-term health of the creek, not just the water quality on the day of the sampling. Mayflies, stoneflies and caddisflies are considered the best indicators of high quality water and habitat. This form weights the presence of these species more heavily than other species that can exist in fair to poor quality water, resulting in a total numeric index that reflects long-term water and habitat quality.

The third category of information collected was a set of chemical parameters measured from water samples taken at each site. The Calvert County Water & Sewage Division provided EPA-standard lab analysis on samples for the following parameters: nitrate nitrogen, total kjeldahl nitrogen (TKN, measuring mainly ammonia), total phosphates, pH, and fecal coliform. Clean sample bottles from the Solomons Wastewater Treatment Facility laboratory were used to collect the water for most of the chemical tests, and separate sterilized bottles were used to collect and fix samples for the fecal coliform tests.

In addition to the laboratory analyses, dissolved oxygen (DO) was tested in the field at some sampling stations. A LaMotte brand direct reading titrator test kit was used with a process based on the Winkler reagent method. This test kit would

not meet EPA standards for water analysis, but provides a fairly reliable result for watershed management decision-making.

Nutrient sampling (nitrates, TKN, phosphates) are critical measures that can detect pollution sources such as failed septic systems, contaminated stormwater runoff, and agricultural overfertilization from crops and animal wastes. Water characteristics such as pH and DO can also be indicators of pollution problems, pH of acid precipitation and DO of nutrient contamination or other ____.

Results

Hunting Creek is a fairly healthy network of streams with generally good water quality and habitats, but poor macroinvertebrate counts show that some problems are impacting the living resources in the creek. Some factors varied little from site to site. For example, virtually no phosphates were discovered at any location, and pH was a consistent 6.8-7.2. Varying individual results of assessment and testing are discussed below for each sampling site. Table 4 that follows summarizes the macroinvertebrate and habitat assessment ratings along with the chemical analyses. Table 5 lists habitat factors in more detail for each site.

Site 1:

The first site sampled was in the county-owned lands behind the Calvert Pines Senior Center near the headwaters of Mill Creek, a southern tributary to Hunting Creek. The swampy, organic soils in the floodplain area were well vegetated with forest and some shrub undergrowth. The habitat assessment gave this site a good rating, but no prime indicator macroinvertebrates were found at all (stoneflies, mayflies or caddisflies). The bed composition was mostly sand, which could be partly responsible for the lack of insects. This site had the highest nitrate-nitrogen and TKN levels found, but still only trace amounts were found. Fecal coliform counts were within reasonable levels for a wooded stream.

Site 2:

The unnamed tributary that flows behind Calvert Memorial Hospital has some of the most developed drainage areas in the Hunting Creek watershed. This stream runs immediately behind several large commercial developments before reaching the back side of the hospital. Erosion damage and pollution from stormwater runoff from impervious parking surfaces was obvious throughout this stretch of the stream. The stormwater management structures built to prevent such damaging runoff have not been maintained properly for all the parking lots, leading to large amounts of erosion just above the stream and many pollutants in the stormwater entering directly into the stream. The habitat assessment still arrived at a good score because of the well-forested buffer area on the county-owned lands behind the hospital, but the very poor macroinvertebrate sampling indicates the level of sedimentation and pollution at the site. Much of the stream bottom was silt and sand, likely from erosion at the hospital and recent upstream commercial development.

Chemical indicators were no worse at this site than any other, with only a

trace of nitrates and TKN and a low fecal coliform count. However, the water itself was slightly brown with an oily sheen and a slight musky smell, and most streambed surfaces were covered with algae.

Site 3:

The Sewell Branch is a fairly large tributary that joins Hunting Creek from the north just before passing under Routes 2-4. This was the one site sampled that found large numbers and variety of insects, leading to a good invertebrate rating. The habitat assessment turned in a good/excellent rating because of the relatively untouched habitat in the flood plain with stable banks and good vegetation. The stream bottom here was almost entirely silt however, partly a result of years of agriculture and residential development upstream. The good macroinvertebrate rating is because of the large numbers of insects found within leaf packs and other organic matter masses, not because of a good gravel-sand substrate. Perhaps this result indicates that the sedimentation is not as big a problem for the insect larvae as other chemical pollution factors for which this survey did not sample. Nitrate and TKN levels do not seem to be causing a problem, and fecal coliform levels are within the expected range.

Site 4:

Mill Creek was sampled further downstream at the Stoakley Road crossing. The area was dammed by beavers just prior to the sampling date, so the invertebrate sampling and habitat assessment was not completed in the fall. [Will finish this paragraph upon completion of those two forms next weekend.]

This site had the highest fecal coliform count of any site sampled, 109 MPN/100 ml. This level could indicate a minor problem with a failed septic nearby, but it could just as easily be from one or two farm animals or even a deer population nearby.

Site 5:

Reits Branch, another tributary from the northern half of the watershed, was sampled just south of Walton Road in a wooded ravine with several nearby farms and some residential. The stream was heavily sedimented and very unstable, with no gravel visible at all. The habitat assessment gave a good rating while the macroinvertebrate count was poor. The water itself was carrying a good amount of sediment, with some foam near a culvert exit. Nutrient measurements were again very low, as was the fecal coliform count.

Site 6:

The sampling site in the middle of the Hunting Creek Farms development is downstream from the hospital on the same unnamed tributary. [Habitat and

macroinvert. sampling forthcoming.]

Nutrient levels were very low, as were the fecal coliform counts.

Site 7:

The mainstem of Hunting Creek was sampled near the middle of the freshwater section south of Plum Point Road near the Plum Point Elementary School. The habitat assessment gave a good/excellent rating, indicative of the large expanses of forest surrounding the creek and extending all the way up the 100-foot steep stream valley sides. Some crop fields and residential houses were scattered on the highlands above this stream valley, but the mostly original forest is barely disturbed. The macroinvertebrate count is only fair, despite the good general habitat, perhaps because the streambed is entirely silt and very soft.

Dissolved oxygen was tested in the field at 10 ppm, an expected value for a small tumbling stream. Nutrient tests revealed little of concern, and fecal coliforms registered their lowest count at this site, perhaps a reflection of the great distance between the stream and any human activities.

Site 8:

The upper reaches of the mainstem were sampled behind Emmanuel Court. Considerable residential development has occurred near the stream, but most places have maintained a minimum 20-30 yard buffer of woods and shrubs. The habitat assessment still showed good/excellent for the stream itself, but the macroinvertebrate count was very poor. The stream bottom was entirely silt, perhaps a function of the geology of the area instead of just sedimentation, however. Fecal coliform counts were slightly high (79 MPN/100 ml), but the other nutrient tests were very low. Dissolved oxygen was also an expected 11 ppm.

Table 4. Summary of Selected Water Quality Data for Eight Sampling Sites on Hunting Creek.

Site Number	Habitat Rating	Invertebrate Rating	NO3-N mg/l	TKN mg/l	PO4 mg/l	pH	Fecal Coliform
1	Good	Poor	0.35	0.5	<0.2	7.1	46
2	Good	Poor	0.17	0.1	<0.2	7.1	22
3	Good/Excellent	Good	0.15	0.4	<0.2	6.9	46
4			0.17	0.3	<0.2	7.2	109
5	Good	Poor	0.2	0.3	<0.2	7.0	23
6			0.18	0.2	<0.2	7.2	23
7	Good/Excellent	Fair	0.09	0.5	<0.2	6.8	13
8	Good/Excellent	Poor	0.12	0.4	<0.2	7.1	79

Discussion

Despite fairly low nutrient contamination levels and good habitats, macroinvertebrate ratings were consistently low across all eight sampling sites. Sedimentation, substrate problems, and toxic chemicals are all potential causes for the low invertebrate ratings, but it is not possible to isolate the cause without significant additional research. A literature search for studies of similar streams could provide direction to which causes to focus on, but detailed, expensive chemical analysis for toxic chemicals and other pollutants might be necessary.

Sedimentation seems to be the easiest culprit to blame for the lack of a healthy insect community in the stream. However, the correlation is not necessarily strong in this small sampling between the strongest invertebrate communities (Sites 3 and 7, Table 4) and the least sedimented sites (3 and 8, Table 5). The composition of the substrate (silt, sand and gravel percentages on the stream bed) can also have a major impact on the living resources, but, again, the best substrate with high gravel levels (at sites 1 and 2) does not seem to correlate to the best insect communities (3 and 7).

Another related factor is the availability of instream habitat for small invertebrates, such as undercut banks, logs, leaf packs, and other unmoving items that trap pieces of detritus from the stream flow. This factor was assessed as one element of the overall habitat assessment. This factor does correlate most closely with the strength of the macroinvertebrate community of all the factors measured by

this survey, with sites 3, 7, and 8 having the best instream habitat for organisms (Table 5). The question remains, however, what factors outside the streambed have resulted in the better habitat inside the stream banks.

Table 5. Stream Habitat Quality Assessment and Other Factors for Eight Sampling Sites on Hunting Creek

Site No.	Habitat Score	Habitat Rating	Bed Composition	Land Uses	Water Color/ Odor	Sediment Deposition/ Instream Habitat
1	81	Good	95% sand 5% gravel	Commercial, woods	Oily/ none	Good/ Fair
2	74	Good	20% silt 60% sand 20% gravel	Commercial, woods	Brown, oily/ musky	Fair/ Fair
3	89	Good/ Excellent	80% silt 20% sand	Woods, stores, highway	Milky/ none	Excellent/ Good
4						
5	81	Good	90% silt 10% sand	Crops, homes, woods	Muddy, scum/ musky	Fair/ Fair
6						
7	87	Good/ Excellent	100% silt	Crops, homes, woods	brown, milky/ none	Good/ Good
8	94	Good/ Excellent	100% silt	Meadow, homes, woods	Foamy, milky/ musky	Excellent/ Excellent

Citizen Monitoring Options

Elements of Citizen Monitoring

[Outline:]

* Discuss general Volunteer monitoring requirements

1. Clear goals for program and purpose for data: should it be to collect data, or simply to educate the citizen monitors to be more environmentally aware?
2. Decide what quality data needed, therefore what kind of testing (quantitative vs. qualitative) and how to supervise, etc.
3. Create budget for testing equipment, staff time for organizing program, and balance costs with benefits.
4. Develop program to train and monitor the work of the volunteers. Make sure to provide for feedback for volunteers so they can see the use of the data they collect.
- 5.

Applicability to Hunting Creek

Discuss number of sites, number of volunteers potentially necessary, methods of organizing and contacting, potential timetables if decide to pursue in coming year, etc.

Conclusion

- According to simple chemical measures, Hunting Creek is a very clean stream. However, the relatively low presence of the best indicator macroinvertebrates shows that at least some features of the natural stream are being negatively affected by human development. Further research should locate information on historic levels of macroinvertebrates on streams of this kind in the coastal plain, even though data on Hunting Creek itself may not be available. This data would give a better perspective on how unusual such insect communities are for this part of the country.

- Instream habitat and sedimentation seem to be most important factors that correlate to healthy macroinvertebrate communities. Need to examine what other causes are affecting those two factors to be able to improve instream habitat. Generally, increased sedimentation from urban development and improper agricultural practices, even from short-term events, can create large sedimentation and related erosion problems far downstream. This sedimentation and erosion also destroys or moves the stable instream elements (banks, logs) that catch detritus and create a good environment for the insects and other life forms. The magnitude of wooded buffer zones around a stream is also a likely factor that affects the amount of organic detritus that enters the stream to create this good habitat.



Bibliography

APPENDICES

